



**CSIR-CENTRE FOR CELLULAR AND MOLECULAR BIOLOGY**  
**(Council of Scientific and Industrial Research)**  
**Uppal Road, Habsiguda, Hyderabad - 500 007, Telangana.**  
**Website: <https://www.ccmb.res.in>**



No. CCMB/Rect./Advt. No. 04/2023/Gr. II (1)

Dated: 04.02.2026

### **NOTICE**

**Sub.: Schedule of Trade Test and Competitive Written Examination for the posts of Gr. II (1) / Technician (1), Post Codes: TE-07, TE-08, TE-09 & TE-10 – reg.**

**Ref.: 1. CSIR-CCMB Advt. No. 04/2023**  
**2. CSIR-CCMB Notice No. CCMB/Rect./Advt. No. 04/2023 dated: 18.06.2025**

It is to inform to all the candidates who have been shortlisted for the advertised posts of Gr. II (1)/Technician (1), Post Codes: **TE-07, TE-08, TE-09 & TE-10** vide CSIR-CCMB, Advt. No. 04/2023, that the detailed schedule of the Trade Test and Competitive Written Examination is given below:

#### **Trade Test Schedule:**

<b>Post Codes</b>	<b>TE-07, TE-08, TE-09 &amp; TE-10</b>
<b>Date of Trade Test</b>	<b>26.02.2026 (Thursday)</b>
<b>Timing</b>	<b>10:00 AM to 06:30 PM</b>
<b>Reporting Time</b>	<b>08:30 AM</b> <b>(Candidates shall not be allowed after 10:00 AM)</b>
<b>Venue</b>	<b>National Academy of Construction (NAC),</b> <b>NAC Grounds, Cyberabad, Hyderabad-500084,</b> <b>Telangana, India.</b> <b><a href="https://maps.app.goo.gl/74XJAEahr7RSEjmR9">https://maps.app.goo.gl/74XJAEahr7RSEjmR9</a></b>

**Note: The candidates are advised to plan their travel in such a way that they should stay till completion of Trade Test in case of any delay/spill over to the next day due to logistical constraints.**

The Syllabus for the Trade Test and Concerned Subject (Paper-III) in Competitive Written Examination for the aforementioned postcodes is enclosed as **Annexure I, II, III & IV.**

**The detailed instructions are available on the Admit card, which may be downloaded from the below link for Trade Test w.e.f. 16.02.2026 after 04:00 PM.**  
**[https://recruitment-staff.ccmb.res.in/Advt\\_04\\_2023\\_Gr2/](https://recruitment-staff.ccmb.res.in/Advt_04_2023_Gr2/)**

**Only the candidates who qualify in the Trade Test will be allowed to appear for Competitive Written Examination.**

### **Competitive Written Examination Schedule:**

<b>Post Codes</b>	<b>TE-07, TE-08, TE-09 &amp; TE-10</b>
<b>Date of Competitive Written Examination</b>	<b>06.03.2026 (Friday)</b>
<b>Venue</b>	<b>CSIR-Centre for Cellular &amp; Molecular Biology, Uppal Road, Habsiguda, Hyderabad, Telangana-500007</b>

The candidates are requested to visit CSIR-CCMB website <https://www.ccmb.res.in> regularly for recruitment updates.

For any queries regarding downloading of Admit cards may be e-mailed to [recruitment.ccmb@csir.res.in](mailto:recruitment.ccmb@csir.res.in) on or before 23.02.2026.

**Dated: 04.02.2026**

**Sd/-  
Sr. Controller of Administration**



# CCMB

# **Annexure-I**

**Syllabus for the Trade Test**

**&**

**Competitive Written Examination**

**Post Code: TE-07**

## 7. TRADE SYLLABUS

SYLLABUS FOR REFRIGERATION & AIR CONDITION TECHNICIAN TRADE			
FIRST YEAR			
Duration	Reference Learning Outcome	Professional Skills (Trade Practical) With Indicative Hrs..	Professional Knowledge (Trade Theory)
Professional Skill 25 Hrs.; Professional Knowledge 04 Hrs.	Identify trade related hazards and safety procedures following safety precautions. NOS ELE/N 1002	<ol style="list-style-type: none"> <li>1. Identify workshop &amp; machineries. (10 hrs.)</li> <li>2. Demonstrate Safety precautions and First aid. (05 hrs.)</li> <li>3. Demonstrate firefighting (05 hrs.)</li> <li>4. Demonstrate working at height using PPE's and identify the hazards and take personal safety precautions. (5 hrs.)</li> </ol>	<p>Introduction to trade and related industries.</p> <p>General safety precautions and first aids, firefighting equipment and electrical safety.</p> <p>History of Refrigeration and Air conditioning.</p> <p>Grooming of technicians.(04 hrs..)</p>
Professional Skill 25Hrs.; Professional Knowledge 5 Hrs.	Produce fitting jobs as per drawing (Range of operations, marking, sawing, filing, drilling.) NOS ELE/N3114	<ol style="list-style-type: none"> <li>5. Identify general tools, instruments &amp; equipment. Care and maintenance of tool, instruments and equipment. (10 hrs.)</li> <li>6. Perform measuring, marking, punching, hacksawing and flat filing, to make a job as per drawing. (15 hrs.)</li> </ol>	<p><b>Fitting</b></p> <p>Different types of Fitting hand tools,- their use. Function, construction, working and Specification.</p> <p>Machineries and equipment used in fittings like drilling machine and grinding machine. (05 hrs)</p>
Professional Skill 25 Hrs.; Professional Knowledge 04 Hrs.	Produce Sheet metal components (range of operation marking, metal cutting, bending, riveting and soldering etc.) NOS ELE/N3114	<ol style="list-style-type: none"> <li>7. Perform Sheet Cutting by straight snip as per drawing. (07 hrs.)</li> <li>8. Perform Sheet Cutting by bent snip as per drawing. (07 hrs.)</li> <li>9. Bend, fold and join metal sheets in different process. (06 hrs.)</li> <li>10. Join sheet metal by using rivet set and snap. (05 hrs.)</li> </ol>	<p><b>Sheet Metal</b></p> <p>Function, construction, working, use, and application, specification of Sheet metal tools, instruments and equipment. Care and maintenance of tools. Rivet &amp; riveting- their types and use. (04 hrs..)</p>
Professional	Identify electrical	11. Demonstrate electrical	<b>Electrical</b>

<p>Skill 35 Hrs.;</p> <p>Professional Knowledge 06 Hrs.</p>	<p>safety. Join different wire, measure power, currents, volts and earth resistance etc. Connect single phase motors. NOS ELE/N 1002</p>	<p>safety precautions and first aid. (05 hrs.)</p> <p>12. Identify, use and maintain electrical tools. (05 hrs.)</p> <p>13. Measure current, voltage, resistance ,power, energy using analog and digital meter through a single phase circuit. (25 hrs.)</p>	<p>Electrical terms such as AC and DC supply, Voltage, Current, Resistance, Power, Energy, Frequency etc.</p> <p>Safety precautions to be observed while working on electricity. Conductors and Insulators, Materials used as conductors. Series and parallel circuit, open circuit, short circuit, etc.</p> <p>Measuring Instruments such as voltmeter, ammeter, ohm meter, watt meter, energy meter and frequency meter. Earthing and its importance. Earth resistance. Insulation and continuity test.(06 hrs..)</p>
<p>Professional Skill 47 Hrs.;</p> <p>Professional Knowledge 10 Hrs.</p>	<p>Identify the electronic components and their colour code i.e. transistor, capacitor, diode, amplifier, I.C and able to work soldering. NOS ELE/N3112</p>	<p>14. Identify basic electronic components, tools &amp; instrument. (08 hrs.)</p> <p>15. Colour coding of resistors. (05 hrs.)</p> <p>16. Use voltmeter, ammeter and multimeter. (8 hrs.)</p> <p>17. Practice soldering &amp; de-soldering. (8 hrs.)</p> <p>18. Identify transistors, resistors, capacitors, diodes, S.C.R., U.J.T., amplifier and I.C. (08hrs.)</p> <p>19. Construct and test full wave rectifier using diodes. (05hrs.)</p> <p>20. Construct and test a bridge rectifier. (05hrs.)</p>	<p><b>Electronics</b></p> <p>Introduction to Electronics. Basic Principles of semiconductors, Principles and application of Diodes. Solder – its composition and paste. (05 hrs..)</p> <p>Rectification, Zener diode as voltage regulator – transistors parameters- diodes, ICs. (05 hrs..)</p>
<p>Professional Skill 39 Hrs.;</p> <p>Professional Knowledge 7 Hrs.</p>	<p>Perform gas welding, brazing, soldering Observing related safety. NOS ELE/N3112</p>	<p>21. Identify gas welding equipment &amp; accessories. (05 hrs.)</p> <p>22. Demonstrate safety precaution in handling of Oxy-acetylene cylinders, regulators etc. (04 hrs.)</p>	<p><b>Welding</b></p> <p>Introduction to basic principles of commonly used Welding processes, oxy fuel gas welding / cutting, brazing &amp; soldering, nozzles, base metal and filler metal. Use of flux.</p>

		<p>23. Setting up of AIR-LPG, O<sub>2</sub>-LPG and O<sub>2</sub>-C<sub>2</sub>H<sub>2</sub> using can type portable flame set. (04 hrs.)</p> <p>24. Oxy-acetylene gas welding, brazing and cutting on thin sheet metal. (7 hrs.)</p> <p>25. Demonstrate Care &amp; Safety of welding tools and equipment. Back fire arrester. (03 hrs.)</p> <p>26. Set Oxy-acetylene plant, use two stage regulator, adjustment of flame, gas pressure – O<sub>2</sub> and DA. (07 hrs.)</p> <p>27. Perform brazing between Cu to Cu and Cu to MS, Cu to aluminum pipes. (9 hrs.)</p>	<p>Difference between soldering and Brazing in terms of temperatures, filler materials, joint strengths and application. Use of Oxy Acetylene, Oxy LPG, Air LPG and two stage regulators for brazing/soldering. Description of back fire arrester. (7 hrs..)</p>
<p>Professional Skill 100Hrs.; Professional Knowledge 15Hrs.</p>	<p>Identify RAC tools and equipment and recognize different parts of RAC system. Perform copper tube cutting, flaring, swaging, brazing. NOS ELE/N 3108</p>	<p><b>Basic Refrigeration</b></p> <p>28. Identify &amp; use of general hand tools, instruments &amp; equipment used in refrigeration work. (12hrs.)</p> <p>29. Identify &amp; use of special tools, instruments &amp; equipment used in refrigeration work.(13hrs.)</p> <p>30. Identify various refrigeration equipment and components of vapour compression system like compressor, condenser, expansion device</p> <p>31. Unroll, cut and bend soft copper tubes. (04 hrs.)</p> <p>32. Swage and make a brazed joint on copper tubing. (10 hrs.)</p> <p>33. Make flare joints and test</p>	<p><b>Basic Refrigeration</b></p> <p>Basic principle of refrigeration, working, use, specifications of refrigeration tools, instruments and equipment. Fundamentals Thermodynamics law.(05hrs..)</p> <p>Science related to refrigeration, work, power, energy, force, Heat and Temperature, Different temperature scales, Thermometers, Units of heat, sensible heat, latent heat, super heating and sub-cooling, saturation temperature, pressure, types, units. Types of Refrigeration systems, including vapour absorption refrigeration cycle</p>

		<p>them with flare fittings. (10 hrs.)</p> <p>34. Pinch off copper tubing. (04 hrs.)</p> <p>35. Use lock ring tool and various fittings of lock ring for servicing of appliances. (10 hrs.)</p> <p>36. Brazing of Cu to Cu, Cu to steel, Cu to brass using AIR LPG suitable in RAC machine. (07 hrs.)</p> <p>37. Brazing of Cu to Cu, Cu to steel, Cu to brass using Oxy- LPG. (07 hrs.)</p> <p>38. Brazing of Cu to Cu, Cu to steel, Cu to brass using Oxy-Acetylene. (11 hrs.)</p>	<p>(VARC), water – combination. Study the construction and working of vapor compression cycle, low side &amp; high side of vapour compression system. Applications of vapour compression cycle. Coefficient of Performance (COP), Ton of Refrigeration.(7 hrs..)</p> <p>Construction and working of V.C Cycle, fundamental operations, sub cooling and super heating.(03 hrs..)</p>
<p>Professional Skill 49 Hrs.;</p> <p>Professional Knowledge 10 Hrs.</p>	<p>Test mechanical &amp; electrical components. Perform leak test, vacuuming, gas charging, wiring in refrigerator. NOS ELE/N3112</p>	<p>39. Identify electrical and mechanical components of refrigerator direct cool and frost free. (05 hrs.)</p> <p>40. Check and replace electrical components of refrigerators. (14 hrs.)</p> <p>41. Leak test, evacuation, gas charging in a refrigerator. (15 hrs.)</p> <p>42. Wiring circuit of refrigerator. (15 hrs.)</p>	<p><b>Refrigerator (Direct cool &amp; Frost free)</b> Function, construction, working of single door direct cool refrigerator, frost free refrigerator, specifications, trouble shooting. Heat Insulation materials. Care and maintenance of refrigerators. (10 hrs.)</p>
<p>Professional Skill 16Hrs.;</p> <p>Professional Knowledge 03 Hrs.</p>	<p>Identify electrical and mechanical components of a refrigerator. NOS ELE/N3112</p>	<p>43. Installation of refrigerator. (8 hrs.)</p> <p>44. Check, Find Fault and test the electrical and other system components of refrigerator. (8 hrs.)</p>	<p><b>Refrigerator (Direct cool &amp; Frost free)</b> Study the electrical components of refrigerator.</p>
<p>Professional Skill 30 Hrs.;</p> <p>Professional Knowledge 07 Hrs.</p>	<p>Test compressor motor terminal, start compressor with relay &amp; without relay, technique of flushing, leak testing, replacing</p>	<p>45. Testing of compressor. (05 hrs.)</p> <p>46. Identification of motor terminals. (05 hrs.)</p> <p>47. Start the compressor with and without relay. (05 hrs.)</p> <p>48. Test performance of</p>	<p>Importance of flushing in evaporator and condenser, use of dry nitrogen for flushing, necessity of replacing capillary and drier. Evacuation, leak testing, gas charging method in refrigerator, (07 hrs..)</p>

	capillary & filter drier, evacuation & gas charging. NOS ELE/N3112	<p>direct start refrigerator. (05 hrs.)</p> <p>49. Cleaning and flushing of evaporator and condenser with dry nitrogen. (05 hrs.)</p> <p>50. Replacement of capillary tube and drier. (05 hrs.)</p>	
Professional Skill 42 Hrs.;  Professional Knowledge 10 Hrs.	Check components of frost-free refrigerator (electrical mechanical), wiring of frost-free freeze & air distribution in refrigerator sector. Leak detection, evacuators & gas charging. NOS ELE/N3112	<p>51. Tracing electrical circuit of Frost-Free refrigerator. (10 hrs.)</p> <p>52. Checking, fault finding and testing of electrical accessories like thermostat, timer, defrost heaters, bi- metal, air louvers etc. and other system components. (10 hrs.)</p> <p>53. Checking air distribution system. (03 hrs.)</p> <p>54. Servicing of refrigerator. (07 hrs.)</p> <p>55. Testing the performance of refrigerator. (02 hrs.)</p>	<p><b>Frost Free Refrigerator</b> Study the construction and working of Frost Free (2 or 3 door) Refrigerator parts particularly, the forced draft cooling, Air Duct circuit, temperature control in Freezer &amp; cabinet of Refrigerator, air flapper / louver used in refrigerator section, automatic defrost system. Study of Electrical accessories &amp; their functions ( Timer, Heater, Bimetal, Relay, OLP, T/S etc.) Refrigerator cabinet volume calculation. (5hrs..)</p>
		<p>56. Identify three and four door no frost refrigerator. (07 hrs.)</p> <p>57. Testing components of three/four door refrigerator. (03 hrs.)</p>	<p><b>Refrigerator (Inverter Technology)</b> Study the construction and its working of two and three door frost free refrigerator with inverter technology Care and maintenance. (05 hrs..)</p>
Professional Skill 39 Hrs.;  Professional Knowledge 10 Hrs.	Dismantle, repair and assemble hermetic, fixed and variable speed compressor, and test performance. NOS ELE/N3112	<p>58. Identify different types of compressor. (09 hrs.)</p>	<p><b>Compressor</b> Function, construction, working, application of hermetic compressor,(Fixed speed and variable speed compressor)like Reciprocating, rotary, scroll and inverter type. (5 Hrs..)</p>
		<p>59. Dismantle /assembling reciprocating/rotary compressor. (15 hrs.)</p> <p>60. Identify different parts of</p>	<p>Study the construction &amp; working of reciprocating, rotary, scroll, wobble &amp; swash plate compressor. wet compression,</p>

		dismantled compressor. (15 hrs.)	oil, properties, lubrication methods. (05 hrs..)
Professional Skill 50 Hrs.;	Identify the terminals of sealed compressor and their wiring and measure current, volts, watts and use of DOL starter with different types of motors NOS ELE/N3112	61. Identify terminal sequence of hermetic compressor motor by using digital multimeter and measure starting current and running current by using ammeter and AVO meter. (12 hrs.)	AC motors and their types. Advantages of AC motor over DC motor. Split phase induction motors, working principle and construction. Starting winding and running winding. Starting current and running current. Study the shaded pole motor, RSIR, CSIR, CSR and PSC motors. 6 Hrs..)
Professional Knowledge 8 Hrs.		62. Identification of terminal sequence of CSIR motor by using digital multimeter and measure starting current and running current by using Ammeter and AVO meter. (13 hrs.)	
		63. Start CSR motor and measure starting current and running current. (07 hrs.)	Centrifugal switch and its function. Common faults, causes and remedies in motors. (02 hrs..)
		64. Start shaded pole motor and measure starting current (18 hrs.)	
Professional Skill 25 Hrs.;	Perform selection of Hermetic compressor for different appliances, starting methods, testing controls & safety cut out used in sealed compressor. NOS ELE/N3112	65. Test open, short, continuity and earth of a hermetic compressor. (04 hrs.)	<b>Motors</b> Function of Starting relay, Capacitors, OLP's.(04 hrs..)
Professional Knowledge 4 Hrs.		66. Start the compressor motor by RSIR, CSIR, PSC & CSR method by using different type relay, capacitors, OLP's, etc. (10 hrs.)	
		67. Check and Test different type relay, Capacitors, OLP's, find out faults and rectification(11 hrs.)	
Professional Skill 16Hrs.;	Identify the Components of control system of Inverter AC and wiring of control	68. Check control circuit of variable speed air conditioners (Inverter ACs). (08 hrs.)	Working principle of inverter technology, advantages of variable speed technology over fixed speed. Working principle of control system for inverter
Professional Knowledge 04		69. Identify components of	

Hrs.	system. NOS ELE/N3114	control system of Inverter ACs including printed circuit board (PCB) NTC,PTC e.g. Power PCB, Filter PCB, Heat sink reactor. (08 hrs.)	Air Conditioners (ACs). (04 hrs..)
Professional Skill 46 Hrs.;	Perform servicing & de scaling of condenser (internals &externals) used in different appliances. NOS CSC/N9413 Perform Fitting &adjustment of drier, filter & refrigerant controls used in different refrigeration system. NOS ELE/N3114	70. Familiarize with different types of condensers used in refrigerators, Bottle coolers, visible coolers, deep freezers, Window and Split AC. (10 hrs.)	<b>Condenser</b> Function of condenser, types, Construction of air-cooled condenser. Effect of choked condenser. Advantages, de scaling of air-cooled condenser, application, and advantages. Liquid receiver, pump down, application, types, function and working.
Professional Knowledge 10 Hrs.		71. Clean, flush, service and leak test different type of air- cooled condensers, micro channel condensers. Remove dust from fins in air cooled condenser, micro channel condensers. (10 hrs.)	
		72. Identify different items necessary for de-scaling like diluted Hcl, Pump & motor, hose, etc. (07 hrs.)	<b>Drier</b> Function of drier, types, application and its advantage. Description of desiccants.
		73. Identify drier and capillary tube used in different cooling machines. (09 hrs.)	<b>Expansion Valve</b> Expansion valve used in domestic refrigeration and air conditioning
		74. Replace drier and capillary tube at the time of gas charging according to manufacturer’s direction. (10 hrs.)	
Professional Skill 16 Hrs.;	Perform servicing of different evaporator used in different appliances. NOS CSC/N9414	75. Identify and service different types of evaporators like plate and tube type, Fin and tube type, etc. fitted in refrigerators, Bottle coolers, water cooler, Window and split AC. (08 hrs.)	<b>Evaporator</b> Working principle, Function, types of evaporators used in refrigerator, water coolers, bottle coolers, window and split A.C, Super heating in evaporators, Function of accumulator and types. Methods of defrosting. (05 hrs..)
Professional Knowledge 05 Hrs.		76. Perform leak test, flush to remove oil by dry nitrogen	

<p>Professional Skill 30 Hrs.;</p> <p>Professional Knowledge 06 Hrs.</p>	<p>Carry out Recovery and Recycling of Refrigerant used, alternative of CFC, HFC re-cover, transfer &amp; handing of gas cylinders. NOS ELE/N3114</p>	<p>in evaporator. (08 hrs.)</p> <p>77. Identify and explain different colour code of different type refrigerant cylinder like HCFCs (HCFC-22, HCFC-123). HFCs (HFC-134a, HFC-32, R- 410A, R-407C and R-404A) and low-Global Warming Potential (GWP) refrigerants like ammonia, R-290, HFC- 32, blends of HFCs (R-410A, R-404A, R-407C etc.) and hydro Fluor olefins (HFOs: HFO-1234yf, HFO-1234ze, HFO-1233zd, HFO-1336mz), blends of HFCs and HFOs. (10 hrs.)</p> <p>78. Recover refrigerant from a faulty machine. (07 hrs.)</p> <p>79. Transfer refrigerant from one cylinder to another using ice. (04 hrs.)</p> <p>80. Measure pressure and temperature of refrigerants including HCFC-22, ammonia, R-290, HFC-32, HFC-134a, R-404A, R-407C and R-410A, HFOs. Identify flammability and toxicity of A3 and A2L of refrigerants. (09 hrs.)</p>	<p><b>Refrigerant</b></p> <p>Classification of refrigerants, nomenclature of refrigerants including chemical name and formulas, hydrochlorofluorocarbons (HCFCs), hydro fluorocarbons (HFCs) and hydro fluoroolefins (HFOs), blends of HFCs and blends of HFCs/HFOs. Climatic impact of refrigerants: Stratospheric ozone depletion, global warming, mechanism of ozone depletion; the Montreal Protocol phase-out schedule of ozone depleting refrigerants (HCFCs) and high global warming refrigerants (HFCs). Brief introduction of Ozone Depleting Substances (Regulation and Control) Rules, 2000 and its amendments. Introduction of properties of refrigerants; environment related properties: Ozone Depleting Potential (ODP), GWP; ODP and GWP of various refrigerants, thermo chemical properties: flammability and toxicity of refrigerants, lower flammability limit (LFL) and upper flammability limit of A3 and A2L refrigerants. Thermo physical properties: pressure temperature of different refrigerants.(06 hrs..)</p>
<p>Professional Skill 22 Hrs.;</p> <p>Professional Knowledge 07 Hrs.</p>	<p>Retrofit CFC/HFC machine with ozone friendly refrigerant with understanding of</p>	<p>81. Demonstrate safe handling of refrigeration cylinders. (10 hrs.)</p> <p>82. Recover CFC by recovery pump and cylinder on CFC filled domestic</p>	<p>Safe handling of flammable refrigerants. Refrigerant leak detection methods, evacuation and charging of refrigerant, temperature glides of refrigerant blends, procedure</p>

	the compatibility. NOS ELE/N3114	refrigerator. (12 hrs.)	of charging of refrigerant blends especially the zeotropic blends, hydrocarbon blends, HFC blends (R-404A, R-407C, R-410A) and blends of HFC/HFO.  <b>Retrofitting</b> Changes of components & practices while retrofitting CFC appliances with HC Refrigerants. Properties of HCs (07 hrs..)
Professional Skill 13 Hrs.;  Professional Knowledge 02 Hrs.	Pack thermal insulation and prevent cooling leakage. NOS ELE/N3114	83. Identify different insulating materials.(polyurethane rigid foam and polystyrene). (03 hrs.) 84. Fill with insulation material like PUF and glass wool. (10hrs.)	<b>Thermal Insulation</b> Function, types, thermodynamic properties of heat insulation materials used in refrigeration and Air Conditioning systems. (02 hrs..)
Professional Skill 50 Hrs.;  Professional Knowledge 7 Hrs.	Install window AC, test Electrical & electronics components & Fault diagnosis & remedial measures. NOS ELE/N3114	85. Acquainting with mechanical and electrical components (electrical components like selector switch, thermostat switch, relay, starting capacitor, running capacitor, overload protector, remote and PCB control, etc. ) used in window air-conditioner. (15 hrs.) 86. Troubleshooting, installation, tracing wiring circuit. (5 hrs..) 87. Leak testing, evacuation and gas charging, Show discharge pressure and suction pressure during running time. (15 hrs.) 88. Hands on practice on installation of window AC following step by step procedure. (15 hrs.)	<b>Window Air Conditioner Study</b>

Professional Skill 100 Hrs.;  Professional Knowledge 18Hrs.	Perform servicing of electrical & electronic control, test, Installation, wiring, fault finding & remedial measures of different split AC. NOS ELE/N3114	<b>Split AC (wall/floor/Cassette)</b> 89. Identify various components of split AC like wall mounted, floor and ceiling mounted, duct able and multi split AC. (04hrs.) 90. Identify electrical circuits of wall mounted split AC. (04hrs.) 91. Test different components and fault finding. (03 hrs.) 92. Leak testing of the system, evacuation and gas charging. (03hrs.) 93. Trouble shooting in split AC. (06hrs.)	<b>Split AC (wall/floor/Cassette)</b>  Construction
		94. Install IDU and ODU of wall mounted split AC. (16hrs.)	<b>Split AC (Wall Mounted)</b> Construction and working principle, types, trouble shooting. Description of electrical components used in split A.C. Study the wiring circuit.
		95. Install IDU of floor, Ceiling /Cassette mounted Split AC. (16hrs.)	<b>SPLIT A.C (floor, Ceiling /Cassette mounted Split A.C)</b> Construction and working principle, types, trouble shooting. Description of electrical components used in split A.C. Study the wiring circuit.
		96. Install IDU and Duct of Ductable split AC. (16hrs.)	<b>SPLIT A.C ( Ducted )</b> Study of the Duct able split AC, its Construction and working principle, types, trouble shooting. Description of electrical components used in split A.C. Study the wiring circuit.
		97. Servicing of Multi Split AC. (16hrs.)	<b>MULTI SPLIT A.C</b> Study the construction and working, various components,

			electrical circuits, testing components, fault detection
		98. Identify the parts of Inverter Split AC. (16hrs.)	<p><b>INVERTER SPLIT A.C.</b>            Study of construction and working principle of inverter AC and its components, electrical circuit and controls, installation, servicing, trouble shooting, fault detection, leak testing and gas charging.            Concept of Indian Seasonal Energy Efficiency Ratio (ISEER).            Energy Efficiency leveling on inverter AC.(18 hrs..)</p>
<b>Engineering Drawing: 40 Hrs.</b>			
Professional Knowledge ED: 40 Hrs.	Read and apply engineering drawing for different application in the field of work. NOS CSC/N9401	<p><b><u>ENGINEERING DRAWING:</u></b></p> <p><b>1. Introduction to Engineering Drawing and Drawing Instruments</b></p> <ul style="list-style-type: none"> <li>• Conventions</li> <li>• Sizes and layout of drawing sheets</li> <li>• Title Block, its position and content</li> <li>• Drawing Instrument</li> </ul> <p><b>2. Lines- Types and applications in drawing</b></p> <p><b>Free hand drawing of –</b>            Geometrical figures and blocks with dimension            Transferring measurement from the given object to the free hand sketches.</p> <ul style="list-style-type: none"> <li>• Free hand drawing of hand tools and measuring tools.</li> </ul> <p><b>3. Drawing of Geometrical figures</b>            Angle, Triangle, Circle, Rectangle, Square, Parallelogram.            Lettering &amp; Numbering – Single Stroke.</p> <p><b>4. Dimensioning</b></p> <ul style="list-style-type: none"> <li>• Types of arrowhead</li> <li>• Leader line with text</li> <li>• Position of dimensioning 5.(Unidirectional, Aligned)</li> </ul> <p><b>Symbolic representation –</b></p> <ul style="list-style-type: none"> <li>• Different symbols used in the related trades.</li> </ul> <p><b>6. Concept and reading of Drawing in</b></p> <ul style="list-style-type: none"> <li>• Concept of axes plane and quadrant</li> <li>• Concept of Orthographic and Isometric projections</li> <li>• Method of first angle and third angle projections (definition and difference)</li> </ul> <p><b>Reading of Job drawing related to trades.</b></p>	
<b>Workshop Calculation &amp; Science: 38</b>			

<p>Professional Knowledge WCS: 38Hrs.</p>	<p>Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. NOS CSC/N9402</p>	<p><b><u>WORKSHOP CALCULATION &amp; SCIENCE:</u></b></p> <p><b>Unit, Fractions</b>            Classification of unit system            Fundamental and Derived units F.P.S, C.G.S, M.K.S and SI units            Measurement units and conversion            Factors, HCF, LCM and problems            Fractions - Addition, subtraction, multiplication &amp; division            Decimal fractions - Addition, subtraction, multiplication &amp; division            Solving problems by using calculator</p> <p><b>Square root, Ratio and Proportions, Percentage</b>            Square and square root            Simple problems using calculator            Applications of Pythagoras theorem and related problems            Ratio and proportion            Ratio and proportion - Direct and indirect proportions            Percentage            Percentage - Changing percentage to decimal and fraction</p> <p><b>Material Science</b>            Types metals, types of ferrous and non ferrous metals            Physical and mechanical properties of metals            Introduction of iron and cast iron            Difference between iron &amp; steel, alloy steel and carbon steel            Properties of insulating materials</p> <p><b>Mass, Weight, Volume and Density</b>            Mass, volume, density, weight and specific gravity, <b>numerical related to L,C,O section only</b>            Related problems for mass, volume, density, weight and specific gravity</p> <p><b>Speed and Velocity, Work, Power and Energy</b>            Work, power, energy, HP, IHP, BHP and efficiency</p> <p><b>Heat &amp; Temperature and Pressure</b>            Concept of heat and temperature, effects of heat, difference between heat and temperature, boiling point &amp; melting point of different metals and non-metals            Scales of temperature, Celsius, Fahrenheit, kelvin and conversion between scales of temperature            Heat &amp; Temperature - Temperature measuring instruments, types of thermometer, pyrometer and transmission of heat -            Conduction, convection and radiation            Co-efficient of linear expansion and related problems with assignments            Problem of heat loss and heat gain with assignments            Thermal conductivity and insulators            Concept of pressure - Units of pressure, atmospheric pressure,</p>
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		<p>absolute pressure, gauge pressure and gauges used for measuring pressure</p> <p><b>Basic Electricity</b> Introduction and uses of electricity, electric current AC,DC their comparison, voltage, resistance and their units</p> <p><b>Mensuration</b> Area and perimeter of square, rectangle and parallelogram Area and perimeter of Triangles</p>
<p><b>In-plant training / Project work:</b></p> <p><b>Broad Area:</b></p> <ul style="list-style-type: none"> <li>a) Assemble a car A.C Cycle</li> <li>b) Assemble window AC / Split AC</li> </ul>		

# **Annexure-II**

**Syllabus for the Trade Test**

**&**

**Competitive Written Examination**

**Post Code: TE-08**

## 7. TRADE SYLLABUS

SYLLABUS FOR PLUMBER TRADE			
DURATION: ONE YEAR			
Duration	Reference Learning Outcome	Professional Skills (Trade Practical) with Indicative Hours	Professional Knowledge (Trade Theory)
Professional Skill 100Hrs; Professional Knowledge 18Hrs	Plan and organize the work to make job as per specification applying different types of basic fitting operation and Check for dimensional accuracy following safety precautions. <i>[Basic fitting operation – marking, Hacksawing, Chiseling, Filing, Drilling, Taping, Threading and Grinding etc. Accuracy: ± 0.25mm]</i> (Mapped NOS:PSC/NO133v1.0, PSC/NO132, PSC/NO134, PSC/NO135, PSC/N9901 v 1.0)	<ol style="list-style-type: none"> <li>1. Importance of trade training, List of tools &amp; Machinery used in the trade. (08hr)</li> <li>2. Safety attitude development of the trainee by educating them to use Personal Protective Equipment (PPE). (5 hrs)</li> <li>3. First Aid Method and basic training. (08hrs)</li> <li>4. Safe disposal of waste materials like cotton waste, metal chips/burrs etc. (05hrs)</li> <li>5. Hazard identification and avoidance. (2 hrs)</li> <li>6. Safety signs for Danger, Warning, caution &amp; personal safety message. (06 hrs)</li> <li>7. Preventive measures for electrical accidents &amp; steps to be taken in such accidents. (04 hrs)</li> <li>8. Use of Fire extinguishers. (7 hrs)</li> <li>9. Practice and understand precautions to be followed while working in the trade. (04hrs)</li> <li>10. Safe use of tools and equipment used in the trade. (1 hr)</li> </ol>	<ul style="list-style-type: none"> <li>• Importance of safety and general precautions required for the trade.</li> <li>• Importance of the trade.</li> <li>• Types of work to be done by trainees in the institute.</li> <li>• Scope of a plumbing work.</li> <li>• Types of services have to plan.</li> <li>• Basic Bench fitting (04hrs)</li> </ul>
		11. Use Steel rule and Steel Tape for measuring, Use Scriber and Divider for marking on	<ul style="list-style-type: none"> <li>• Plumber's common hand tools - names, description and material</li> </ul>

		<p>raw materials. (10hrs)</p> <p>12. Demonstrate use of different types of Vice: - Bench vice, Pipe vice, Chain Vice, Hand vice, Chain Wrench. (20 hrs)</p> <p>13. Demonstrate use of various Hand Tools: - Different Files, Hammer, Centre Punch, Hacksaw, Chisel, Callipers, Pipe Wrench, Stock &amp; Dies, Taps and Holders. (20hrs)</p>	<p>from which they are made.</p> <ul style="list-style-type: none"> <li>• Description, types and uses of holding device, hammers &amp; cold chisels, cutting tools.</li> <li>• Description of simple fitting operations hack sawing, punching and filing.</li> <li>• Types of files used commonly.</li> <li>• Marking instruments and their use of simple drilling machine.</li> <li>• Method of using drills.</li> <li>• Description of simple bench drilling Machine.</li> <li>• Description of Grinding and Chisel.</li> <li>• Description of different types of locking and fastening devices. (14 hrs)</li> </ul>
<p>Professional Skill 15 Hrs;</p> <p>Professional Knowledge 06 Hrs</p>	<p>Perform Inner &amp; Outer Thread cutting on Metal &amp; Studs and thread cutting on different types of pipes &amp; fittings accessories. (Mapped NOS:PSC/NO133)</p>	<p>14. Thread Inner on M.S. flat by using Tap.(5 hrs)</p> <p>15. Use various locking device.(5 hrs)</p> <p>16. Outer thread on Pipe by using Die. (3 hrs)</p> <p>17. Fixing of different Pipe fittings in different position of Pipe. (2 hrs)</p>	<ul style="list-style-type: none"> <li>• About different types of pipes-GI, CI, DI, PVC/CPVC, PPR and HDPE etc.</li> <li>• About different Types of Pipe Fittings: - Socket, Elbow, Tee, Union, Bend, Cap, Plug, Cross, Ferrule etc.</li> <li>• About different types of Thread cutting. (06hrs)</li> </ul>
<p>Professional Skill 20Hrs;</p> <p>Professional Knowledge 08Hrs</p>	<p>Carry out cutting of Pipes of Different dia in different angle and Joining of pipes by gas welding, Soldering and Brazing. (Mapped NOS:PSC/NO133)</p>	<p>18. Cutting different diameter of MS pipes in different angles. (10 hrs)</p> <p>19. Joining of Pipe in same dia by gas welding. (05hrs)</p> <p>20. Joining of Pipes in different dia by gas welding. (05hrs)</p>	<p><b>Gas Welding :-</b></p> <ul style="list-style-type: none"> <li>• Purpose of Gas welding.</li> <li>• Method of gas welding</li> <li>• Safety precautions to be observed -Methods of soldering and brazing - fluxes used &amp; Types of fluxes precautions to be</li> </ul>

			<p>observed.</p> <ul style="list-style-type: none"> <li>• Hard &amp; soft solders - their properties, composition and uses. (08hrs)</li> </ul>
<p>Professional Skill 35Hrs; Professional Knowledge 08Hrs</p>	<p>Construct Masonry brick wall and RCC casting. Brick wall cutting for concealing pipe line. (Mapped NOS:PSC/NO133, PSC/NO134, PSC/NO134)</p>	<p>21. Demonstrate proper handling of Mason's hand tools: - Straight edge, Spirit level, Plumb bob, Square, Trowel etc. (5 hrs) 22. Setting out work with Tape, Rule, Square, Line pin and level as per drawing. (5hrs) 23. Prepare Cement mortars in different proportions to suit various purposes. (5 hrs) 24. Prepare Plane Cement Concrete and RCC in different proportions to suit various purposes. (5 hrs) 25. Benching and Channelling of base plate. ( 5hrs) 26. Damp proofing. (2 hrs) 27. Plastering the walls. (3 hrs) 28. Cutting of Masonry wall for concealing with Electric Cutting Tools. (5 hrs)</p>	<p><b>Mason's works :-</b></p> <ul style="list-style-type: none"> <li>• Names and description of Mason's hand tools and their uses.</li> <li>• Method of making holes in walls and floors.</li> <li>• Types of tools used and various Processes.</li> <li>• Concept of bricks, lime and cement.</li> <li>• Preparation of mortars with various materials of varying composition.</li> <li>• Common brick joints.</li> <li>• Description of bonds.</li> <li>• Scaffolding &amp; plastering.</li> <li>• Define Plain cement concrete, RCC and its proportion,</li> <li>• Grades of coarse aggregate and fine aggregate,</li> <li>• Knowledge of waterproofing compound.</li> <li>• Knowledge of Building Plan and Cross section of wall.</li> <li>• Identify plumbing services required for each type of building according to usage. (08hrs)</li> </ul>
<p>Professional Skill 40 Hrs; Professional Knowledge</p>	<p>Carry out Cutting and Bending of Pipes using Plumber's tools and equipment. (Mapped NOS:PSC/NO133)</p>	<p>29. Demonstrate proper handling of Plumber's Tools &amp; Equipment. (05hrs) 30. Use and care of Plumber's Tools and Equipment.</p>	<ul style="list-style-type: none"> <li>• Description of plumber tools and Equipment- Ratchet brace, Threading die, Pipe wrench, sliding wrench,</li> </ul>

<p>10Hrs</p>		<p>(05hrs)</p> <p>31. Cutting of G.I Pipes of different Diameter and Sizes by cutting tools. (05hrs)</p> <p>32. Cutting of C.I Pipe of different Diameter and Sizes by cutting tools. (05hrs)</p> <p>33. Cutting of all kinds of PVC Pipe of different Diameter and Sizes by cutting tools. (05 hrs)</p> <p>34. Bending of G.I Pipe as per drawing using Bending Machine up to 50 mm dia. (10 hrs)</p> <p>35. Bending of PVC Pipe as per drawing using heat process up to 50 mm dia. (5 hrs)</p>	<p>Spanner set, Chain Wrench etc. and their safety.</p> <ul style="list-style-type: none"> <li>• Care &amp; use of tools.</li> <li>• Pipes of different kinds</li> <li>• Method of Pipe bending in different dia.</li> <li>• Plumbing Symbols and Code for Tools &amp; Materials on water line. (10hrs)</li> </ul>
<p>Professional Skill 25Hrs;  Professional Knowledge 08Hrs</p>	<p>Join Various type of PVC pipe by heat process or Welding. (Mapped NOS:PSC/NO133)</p>	<p>36. Preparation of PVC pipe &amp; Fittings in different dia. (1 hr)</p> <p>37. Preparation and precaution of Electric Hot Plate. (1hr)</p> <p>38. PVC Pipe welding various dia, using welding machine. (13hrs)</p> <p>39. Weld various type of PVC Pipe with various dia, using welding machine. (5hrs)</p> <p>40. PPR pipe welding joint various dia of pipe using welding machine.(5hrs)</p>	<ul style="list-style-type: none"> <li>• Equipment and tools for hot gas welding and electric hot plate for PPR pipe joints. (08hrs)</li> </ul>
<p>Professional Skill 25Hrs;  Professional Knowledge 08Hrs</p>	<p>Construct complete pipe line circuit with different types of Joints and fixing Cocks &amp; valve on Pipe line. (Mapped NOS: PSC/NO133)</p>	<p>41. CI/HCI Pipe Flange joint with Bend and Tee. (5hrs)</p> <p>42. Socket joint of CI Pipes with lead. (5 hrs)</p> <p>43. Detachable joint of AC pressure Pipe. (5 hrs)</p> <p>44. Titan/Socket &amp; Spigot joint of Ductile Iron (DI) Pipe with Rubber ring.(4hrs)</p> <p>45. Prepare and Study the drawing of Pipe line circuit and schedule use of Tools and accessories.(2hrs)</p>	<ul style="list-style-type: none"> <li>• Types of fittings for different joints &amp; different pipes.: - CI,HCI,AC,AC Pressure, DI, GI Pipes. Joints: - Flange joint, Socket joint with lead, Detachable joint, Socket &amp; Spigot joints etc.</li> <li>• Description of pipe fittings.</li> <li>• Methods of joining and</li> </ul>

		46. Make a Pipe line circuit on GI Pipe with Socket, Elbow, Bend, Flange, Tee, Union etc. And Fixing Cocks & Valves as per drawing. (4hrs)	<p>their uses.</p> <ul style="list-style-type: none"> <li>• Precautions to be taken while fixing (08hrs)</li> </ul>
Professional Skill 25Hrs;  Professional Knowledge 06Hrs	Carry out Cutting of Different Types of PVC Pipe, joining and laying. (Mapped NOS: PSC/NO133)	<p>47. PVC pipe cutting &amp; shaping in various dia, using Hacksaw and Pipe cutters. (10 hrs)</p> <p>48. Preparation of PVC pipe and Fittings with emery paper. (5hrs)</p> <p>49. Use &amp; fixing of PVC fittings use Solvent Cement etc. (5hrs)</p> <p>50. Layout of PVC pipe according to drawing. (5hrs)</p>	<ul style="list-style-type: none"> <li>• Different kinds of Joints, Fittings and Materials in joining pipes: - PVC/CPVC, PPR and HDPE etc. (06hrs)</li> </ul>
Professional Skill 25Hrs;  Professional Knowledge 06Hrs	Perform Water analysis test, Water Pressure test and Water distribution system by using Pipe line. (Mapped NOS:PSC/NO133)	<p>51. Preparation of Water and Water analysis kit. (1 hr)</p> <p>52. Water Analysis Test by Analysis Kits. pH, TDS, Temperature etc. (4hrs)</p> <p>53. Preparation of Hydraulic Pressure Test Machine. (1 hr)</p> <p>54. Static water pressure test by Hydraulic Pressure Test Machine apply on Plastic Water bottle. (4hrs)</p> <p>55. Static water pressure test by Hydraulic Pressure Test Machine apply on Cistern and Tank. (4hrs)</p> <p>56. Steps of simple pipe line connection as per drawing. (3 hrs)</p> <p>57. Make a pipe line for water distribution as per drawing. (4hrs)</p> <p>58. Make a pipe line for OHR water distribution system as</p>	<p><b>Composition of Water: -</b></p> <ul style="list-style-type: none"> <li>• Sources of water</li> <li>• Hard &amp; Soft water, temporary hardness &amp; permanent hardness.</li> <li>• Impurities of water – organic and inorganic impurities.</li> <li>• Water purification stages and methods.</li> <li>• Static water pressures and measurement of pressures. Bursting pressure,</li> <li>• Expansion of water on freezing and heating.</li> <li>• Bernoulli's principles</li> <li>• Pascal's law.</li> <li>• Pressure of water on the sides of cistern or tank.</li> <li>• Water hammer in pipes.</li> <li>• Description and working</li> </ul>

		per drawing. (02hrs) 59. Installation of water hammer arrester. (02 hrs)	of water hammer arrester. (08hrs)
Professional Skill 45Hrs;  Professional Knowledge 10Hrs	Align and lay humid pipe line of different dia. and fitting & maintenance of drainage pipe line. (Mapped NOS: PSC/NO135)	60. Interpret drawing of sanitary plumbing. (08hrs) 61. Lay & align hummed pipe. (05hrs) 62. Demonstrate use of specific dia in different location. (04hrs)	<ul style="list-style-type: none"> <li>• Use of hummed pipes of different sizes.</li> <li>• Method of laying out pipes alignment and joining. (05hrs)</li> </ul>
		63. Use various sanitary fitting. (06 hrs) 64. Use various fitting of different materials. (06 hrs) 65. Use joining materials of pipe. (10 hrs) 66. Join pipe as per laid down Procedure. (06 hrs)	<ul style="list-style-type: none"> <li>• Description of various pipe joints- straight, Branch, Taft and blow, Expansion joints. Solders and fluxes used in joints. (05hrs)</li> </ul>
Professional Skill 60Hrs;  Professional Knowledge 10Hrs	Install and maintain different Electric pumps. (Mapped NOS: PSC/NO135)	67. Demonstrate use of different pump. (10 hrs) 68. Demonstrate installation of electric pump (10 hrs) 69. Demonstrate maintenance of electric pump. (10 hrs) 70. Demonstrate working process of centrifugal, reciprocating, submersible pump. (15 hrs) 71. Demonstrate delivery of water to overhead tank through pump, presser head, delivery pipe, suction pipe, etc, (15 hrs)	<ul style="list-style-type: none"> <li>• Description of Plumber's materials Lead, tin, Zinc, solder, copper, red lead etc. and their uses.</li> <li>• Water supply system of a small town.</li> <li>• Description and types of pumps viz. suction pump, Centrifugal pump etc. Contamination of water in a well. (10 hrs)</li> </ul>
Professional Skill 30 Hrs;  Professional Knowledge 06 Hrs	Join fittings for different purposes on PVC pipe line. (Mapped NOS:PSC/NO133)	72. Produce BSP thread on pipe. (05 hrs) 73. Produce Internal and external thread on PVC pipes of different dia. (05 hrs) 74. Join PVC pipe with thread. (05hrs) 75. Join PVC pipe with solvent cement and heat process(05hrs)	<ul style="list-style-type: none"> <li>• Description of pipe dies, their uses, care and precaution.</li> <li>• Metric specification of various pipes.</li> <li>• Standard pipe threads.</li> <li>• Method employed for bending, Joining and fixing PVC pipe.</li> <li>• Joining material for</li> </ul>

		76. Join PVC pipe as per layout. (10hrs)	water and gas pipes. • Use of blow lamp. (06 hrs)
Professional Skill 25Hrs; Professional Knowledge 07 Hrs	Construct inspection chamber, manhole, gutter, septic tank, socket etc. (Mapped NOS: PSC/NO135)	77. Demonstrate inspection chamber, manhole, gully trap, septic tank, soak pit. (04 hrs) 78. Construct inspection chambers, cesspool, septic tank, soak pit etc. (21 hrs)	• Inspection chamber, septic tank, description of drains, cesspools, soak pits etc. • Types of traps • layout of drainage system (07 hrs)
Professional Skill 25Hrs; Professional Knowledge 05Hrs	Test pipe line as per site drainage pipe line layout. (Mapped NOS: PSC/NO135)	79. Demonstrate drawing layout of drainage pipe line. (06 hrs) 80. Perform testing for smoke test, water test, smell test, ball test mirror test. (10 hrs) 81. Join heavy cast iron socket pipe. (03 hrs) 82. Sealing of heavy cast iron pipe joint with lead & caulking tools. (06 hrs)	• Method of bending pipes by hot and cold process. • Method of testing drainage lines (05hrs)
Professional Skill 25Hrs; Professional Knowledge 04 Hrs	Perform removal of leakage in pipe line. (Mapped NOS: PSC/NO133)	83. Identify location of leakage pipe. (06 hrs) 84. Removing out leakages pipe. (10 hrs) 85. Removing of air locks (06 hrs) 86. Demonstrate rain water harvesting system. (03 hrs)	• Method of dismantling and renewal of the valves and pipes. Leaks in pipes and noises in plumbing. • Installation of water meters. Air lock in pipes and its removal. (04hrs)
Professional Skill 75 Hrs; Professional Knowledge 10 Hrs	Install, fix & maintain different valve & cock and sensor system of sanitary fittings. (Mapped NOS: PSC/NO136)	87. Demonstrate different cocks & valves including materials. (10 hrs) 88. Employ cocks & valves at different place. (20 hrs) 89. Employ different cock& valve with sensor system. (20 hrs) 90. Demonstrate maintenance of different cocks & valves. (15 hrs) 91. Demonstrate use of packing washer gasket of different cock & valve. (10 hrs)	• Description of cocks & valves-their types, materials & advantages for particular work. • Description of different type of diverts i.e. two way and three way • Sensor system for urinals and wash basin etc.(10hrs)
Professional	Install & maintain	92. Demonstrate location of	• Erecting rain water and

<p>Skill 75 Hrs; Professional Knowledge 14 Hrs</p>	<p>water meter and water supply for different fixtures. (Mapped NOS: PSC/NO133)</p>	<p>meter. Fitting of water meter, bath tub, wash basin. (10 hrs) 93. Install water metre, bath tub, hand wash basin, water closet urinal, sink etc with sensor system. (20 hrs) 94. Demonstrate maintenance of water metre, bath tub, hand wash basin, water closet urinal, sink etc. (15 hrs) 95. Demonstrate testing of water metre, Bath Tub, Hand wash basin. (10 hrs) 96. Demonstrate rain water and drainage pipe system. (10 hrs) 97. Installation of concealed flushing cistern. (10 hrs)</p>	<p>drainage pipe system,  <ul style="list-style-type: none"> <li>• Installation of sanitary fittings, inspection and testing of water supply system.</li> <li>• -Pipe alignment and slope. -Prevention of water hammer.</li> <li>• Storage tanks for general water supply propose.</li> <li>• Test for water supply pipes.</li> <li>• Description of sanitary fittings,</li> <li>• general points to be observed when choosing sanitary.</li> <li>• Description of concealed flushing cistern (14hrs)</li> </ul> </p>
<p>Professional Skill 50Hrs; Professional Knowledge 05Hrs</p>	<p>Demonstrate method of bending for different materials &amp; different pipe joint. (Mapped NOS: PSC/NO133)</p>	<p>98. Demonstrate bending of pipes in bending machine. (08 hrs) 99. Bend GI pipe of different diameter in different angle. (14 hrs) 100. Bend G.I. pipe as per drawing and measurement. (14 hrs) 101. Bend PVC pipe of different diameter in different angle with dry sand by heating. (14 hrs)</p>	<p>Method of bending galvanized mand other heavy pipes. (05hrs)</p>
<p>Professional Skill 50Hrs; Professional Knowledge 05Hrs</p>	<p>Perform fitting and maintenance of Fixture at different place. (Mapped NOS: PSC/NO136)</p>	<p>102. Demonstrate process of C.I pipe cutting &amp; joining. (12 hrs) 103. Process of C.I. pipe fitting for waste pipe line in different section. (08 hrs) 104. Employ Process of fixing of external soil pipe. (12 hrs) 105. Demonstrate process of fixing of rain water gutter outlet and ground pipe. (10 hrs)</p>	<p><b>Domestic drainage system:</b> General layout, one pipe system, specifications of Materials required. Method of testing leakage. Different types of traps, ventilation, anti-syphonage and sinks. About Fire hydrants and their fittings. (05hrs)</p>

		hrs) 106. Demonstrate process of measurement of waste pipe line. (08 hrs)	
Professional Skill 25 Hrs;  Professional Knowledge 06 Hrs	Carry out fitting, fixing & laying installation of hot & cold water pipe line and symbolizing. (Mapped NOS:PSC/NO133)	107. Demonstrate working of solar water heating system. (02 hrs) 108. Analyse temperature of water (hot and cold). (02 hrs) 109. Layout pipe line for hot and cold water distribution as per drawing. (04 hrs) 110. Install pipe line for distribution of hot & cold water. (08 hrs) 111. Install hot water system & solar water heating system. (08 hrs) 112. Symbolise distribution of hot & cold water pipe line. (01 hr)	Concept of heat and Temperature. Method of transmission of heat. Heating system by different thermal units. Domestic hot and cold water. General layout, specification of materials required and Connection of pipes to mains. Tracing leakage. Repairs to service main. Domestic boilers and Geysers. Method of ventilating pipe. Precaution against air Poisoning.  Fixing of solar water system. (06hrs)
Professional Skill 25Hrs;  Professional Knowledge 06Hrs	Perform repairing & reconditioning of waste pipe line. (Mapped NOS: PSC/NO133)	113. Perform repairing of different trap, valve, cistern etc. (03 hrs) 114. Demonstrate construction of over head tank as per measurement. (08 hrs) 115. Maintenance and recondition pipe line. (10 hrs) 116. Perform smoke test far waste pipe line. (04 hrs)	Plumbing and sanitary symbols and plumbing codes for all tools and materials (06hrs)
Professional Skill 20Hrs;  Professional Knowledge 02Hrs	Perform repairing& reconditioning, scraping & painting of sanitary fittings pipe line. (Mapped NOS: PSC/NO133)	117. Demonstrate cleaning of sanitary pipe line. (02 hrs) 118. Perform cleaning of sanitary pipe line. (02hrs) 119. Remove corrosion from pipe line. (02hrs) 120. Demonstrate scraping & painting. (02 hrs)	Corrosion - causes and remedies, prevention. Corrosion due to electrolytic action. Effect of water and frost on materials. Layout of pipes as per drawing.

		<p>121. Perform scraping &amp; painting of pipe line. (02hrs)</p> <p>122. Maintenance of broken or cracked sanitary fitting. (05 hrs)</p> <p>123. Estimate and work out abstract cost of plumbing work as per drawing/layout. (05 hrs)</p>	<p>Analysis quantity measurement and abstract rate of plumbing and sanitary work.</p> <p><b>Bill of Quantity and Estimation :-</b></p> <ul style="list-style-type: none"> <li>• Preparation of bill of quantity</li> <li>• Preparation of Estimation(02hrs)</li> </ul>
<b>Engineering Drawing: 40 Hrs.</b>			
Professional Knowledge ED- 40 Hrs.	Read and apply engineering drawing for different application in the field of work.CSC/N9401	<p><b><u>Engineering Drawing : (40 Hrs.)</u></b></p> <p>Introduction to Engineering Drawing and Drawing Instruments–</p> <ul style="list-style-type: none"> <li>• Conventions</li> <li>• Sizes and layout of drawing sheets</li> <li>• Title Block, its position and content</li> <li>• Drawing Instrument</li> </ul> <p>Free hand drawing of–</p> <ul style="list-style-type: none"> <li>• Geometrical figures and blocks with dimension</li> <li>• Transferring measurement from the given object to the sketches.</li> <li>• Free hand drawing of hand tools and measuring tools.</li> </ul> <p>Drawing of Geometrical figures:</p> <ul style="list-style-type: none"> <li>• Angle, Triangle, Circle, Rectangle, Square, Parallelogram.</li> <li>• Reading of dimension and Dimensioning Practice.</li> </ul> <p>Symbolic representation–</p> <ul style="list-style-type: none"> <li>• Different symbols and Pipe joints used in the trade.</li> </ul> <p>Reading of layout plan drawing in piping</p>	
<b>Workshop Calculation &amp; Science: 32 Hrs.</b>			
Professional Knowledge WCS- 32 Hrs.	Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. CSC/N9401	<p><b><u>WORKSHOP CALCULATION &amp;SCIENCE: (32 Hrs.)</u></b></p> <p><b>Unit, Fractions</b></p> <p>Classification of unit system</p> <p>Fundamental and Derived units F.P.S, C.G.S, M.K.S and SI units</p> <p>Measurement units and conversion</p> <p>Factors, HCF, LCM and problems</p> <p>Fractions - Addition, subtraction, multiplication &amp; division</p> <p>Decimal fractions - Addition, subtraction, multiplication &amp; division</p> <p>Solving problems by using calculator</p> <p><b>Square root, Ratio and Proportions, Percentage</b></p> <p>Square and square root</p>	

		<p>Simple problems using calculator</p> <p>Applications of Pythagoras theorem and related problems</p> <p>Ratio and proportion</p> <p>Ratio and proportion - Direct and indirect proportions</p> <p>Percentage</p> <p>Percentage - Changing percentage to decimal and fraction</p> <p><b>Material Science</b></p> <p>Types metals, types of ferrous and non-ferrous metals</p> <p>Physical and mechanical properties of metals</p> <p>Properties and uses of insulating materials</p> <p><b>Mass, Weight, Volume and Density</b></p> <p>Mass, volume, density, weight and specific gravity.</p> <p>Related problems for mass, volume, density, weight and specific gravity</p> <p><b>Heat &amp; Temperature and Pressure</b></p> <p>Concept of heat and temperature, effects of heat, difference between heat and temperature, boiling point &amp; melting point of different metals and non-metals</p> <p>Scales of temperature, Celsius, Fahrenheit, kelvin and conversion between scales of temperature</p> <p><b>Basic Electricity</b></p> <p>Introduction and uses of electricity, molecule, atom, how electricity is produced, electric current AC, DC their comparison, voltage, resistance and their units</p> <p><b>Mensuration</b></p> <p>Area and perimeter of square, rectangle and parallelogram</p> <p>Area and perimeter of Triangles</p> <p>Area and perimeter of circle, semi-circle, circular ring, sector of circle, hexagon and ellipse</p> <p>Surface area and volume of solids - cube, cuboid, cylinder, sphere and hollow cylinder</p> <p>Finding the lateral surface area, total surface area and capacity in litres of hexagonal, conical and cylindrical shaped vessels</p> <p><b>Trigonometry</b></p> <p>Measurement of angles</p> <p>Trigonometrical ratios</p>
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# **Annexure-III**

**Syllabus for the Trade Test**

**&**

**Competitive Written Examination**

**Post Code: TE-09**

## 7. TRADE SYLLABUS

<b>SYLLABUS FOR MASON (BUILDING CONSTRUCTOR) TRADE</b>			
<b>Duration – One Year</b>			
<b>Duration</b>	<b>Reference Learning Outcome</b>	<b>Professional Skills (Trade Practical) With Indicative Hours</b>	<b>Professional Knowledge (Trade Theory)</b>
Professional Skill 76 Hrs;  Professional Knowledge 14 Hrs	Perform wood work with carpenter's tools following safety precautions. (Mapped NOS: IES/N9441)	<ol style="list-style-type: none"> <li>1. Familiarization with Institute, administrative setup of Institute. (3 hrs.)</li> <li>2. Rules &amp; resolutions of attendance with leave facility. (3 hrs.)</li> <li>3. Importance of Trade training, instruments &amp; equipment's used. (5 hrs.)</li> <li>4. Importance of trade training, List of tools &amp; Machinery used in the trade.(4 hrs.)</li> <li>5. Safety attitude development of the trainee by educating them to use Personal Protective Equipment (PPE). (5 hrs.)</li> <li>6. First Aid Method and basic training. (4 hrs.)</li> <li>7. Safe disposal of waste materials like Pieces of wood, rod, stone, mud, etc. (2 hrs.)</li> <li>8. Hazard identification and avoidance. (2 hrs.)</li> <li>9. Safety signs for Danger, Warning, caution &amp; personal safety message. (3hrs.)</li> <li>10. Preventive measures</li> </ol>	<ul style="list-style-type: none"> <li>• Importance of safety and general precautions required for the trade.</li> <li>• Importance of the trade.</li> <li>• Types of work to be done by trainees in the institute.</li> <li>• Scope of a mason work.</li> <li>• Types of services has to plan.</li> <li>• Role of a mason, nature of job done by masons(07 hrs)</li> </ul>

		<p>for electrical accidents &amp; steps to be taken in such accidents. (5 hrs.)</p> <p>11. Use of Fire extinguishers. (9 hrs.)</p> <p>12. Practice and understand precautions to be followed while working in mason jobs. (3 hrs.)</p> <p>13. Safe use of tools and equipments used in the trade. (2 hrs.)</p>	CHAPTER -3 VIDEO DEMO
		<p>Carpenter works :-</p> <p>14. Demonstrate uses of Carpenter's hand tools. (10 hrs.)</p> <p>15. Centering work. Uses of nails, screws, nuts &amp; bolts, hinges etc. (7 hrs.)</p> <p>16. Perform centering &amp; form work. (9 hrs.)</p>	<ul style="list-style-type: none"> <li>• Common types of wood-their description and use.</li> <li>• Carpenter's hand tools, their names and uses.</li> <li>• Carpentry joints and their uses. Use of nails, screws, dowels, etc.(7hrs)</li> </ul>
<p>Professional Skill 150 Hrs;</p> <p>Professional Knowledge 23 Hrs</p>	<p>Plan and organize the work to make masonry brick wall as per drawing and specification applying different types of tools, materials and check for dimensional accuracy. (Mapped NOS: CON/N0144)</p>	<p>17. Handling of brick, turning of brick for stretcher &amp; header faces. (4 hrs.)</p> <p>18. Cutting of brick with brick hammer as desire shape &amp; size. (8 hrs.)</p> <p>19. Shaping mortar, spreading on the bed joining bricks. (10 hrs.)</p> <p>20. Preparation of various types of mortars according to the ratio of ingredients. (6 hrs.)</p> <p>21. Building <math>4\frac{1}{2}</math>" straight wall about 6courses high with one end stepped and the other racked back. (24 hrs.)</p>	<ul style="list-style-type: none"> <li>• Technical terms used in brick masonry. Necessity of bonding bricks. Types of bond Types of mortars, different grades of sand for brick work &amp; plastering. Grades of cement.</li> <li>• Brickwork-racking back &amp; tothing. Differences between English &amp; Flemish bonds. Details of English &amp; Flemish bond for 1 and <math>1\frac{1}{2}</math> brick walls. Precautions at quoins.</li> <li>• Cross wall-method of construction. Grouting of mortar, jointing and finishing of brickwork.</li> </ul>

		<p>22. Building 4<math>\frac{1}{2}</math>" quoin wall with one end stepped and the other raked back. Use of plumb rule. (26 hrs.)</p> <p>23. Construct of 1 &amp; 1 <math>\frac{1}{2}</math> brick wall junctions in English &amp; Flemish bonds. Racking out the joints &amp; finishing it flush. (24 hrs.)</p> <p>24. Construction of 1 brick thick walls in English &amp; Flemish garden bonds. (24 hrs.)</p> <p>25. Construct of detached brick pillars with footings square &amp; rectangular types. (24 hrs.)</p>	<p>Types of pointing &amp; tools used. Details of bonding &amp; special precautions at 'T', 'L' and cross junctions. Types of copings-weathering &amp; throating.</p> <ul style="list-style-type: none"> <li>• Pillars: Necessity, types, relation between cross section &amp; height. Details of reinforcement for square &amp; rectangular pillars.</li> <li>• Types of cement, sand &amp; lime. English &amp; Flemish garden wall bonds. PWD specification on brickwork.</li> <li>• Foundation: Definition, purpose, types, important terms, causes of failure of foundations. (23 hrs)</li> </ul>
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 06 Hrs</p>	<p>Construct wall leaving space for door &amp; window opening. (Mapped NOS: CON/N0144)</p>	<p>26. Form a door opening in a wall of English bond. Bonding of jambs &amp; reveals. (10 hrs.)</p> <p>27. Form a window opening in a wall in English bond. (7 hrs.)</p> <p>28. Construction of sill with over-sailing courses. Use of gauge rod. Fixing door &amp; window frames. (8 hrs.)</p>	<ul style="list-style-type: none"> <li>• Purpose of arch centering &amp; form work. Different types of bricks &amp; their sizes. Characteristics of good bricks. Sizes of mortar joints for different works. Stretcher &amp; header (06 hrs)</li> </ul>
<p>Professional Skill 50 Hrs;</p> <p>Professional Knowledge 7 Hrs</p>	<p>Perform R.C.C casting, rod cutting in different sizes, bending, binding &amp; placing. Mixing &amp; compaction of concrete with different proportions.</p>	<p>29. Demonstrate R.C.C, reinforcement of different dia. With unit weight. Cutting, bending &amp; binding of bar. (4 hrs.)</p> <p>30. Perform Pre-casting a lintel-compacting, curing &amp; setting the same in position. Check for equal</p>	<ul style="list-style-type: none"> <li>• RCC lintels: Materials required,</li> <li>• method of construction, precast lintels,</li> <li>• method of construction of formwork, details of reinforcement.</li> <li>• Arches: Purpose, technical terms &amp; types. Setting out</li> </ul>

	(Mapped NOS: IES/N9442)	<p>bearing. (8 hrs.)</p> <p>31. Spanning of opening by casting alintel in site. (10 hrs.)</p> <p>32. Making of shuttering &amp; supports with uprights and wedges. (7 hrs.)</p> <p>33. Cutting, bending &amp; placing of reinforcement. (4 hrs.)</p> <p>34. Mixing, placing &amp; compacting concrete. (2 hrs.)</p> <p>35. Spanning of opening with a semi-circular arch, making centering, cutting of templates for voussoirs &amp; preparing voussoirs, setting uprights of arch. Construction of arch &amp; removing centering. (15 hrs.)</p>	<p>an arch. (7 hrs)</p>
Professional Skill 25 Hrs; Professional Knowledge 04 Hrs	Perform Construction of cavity wall. (Mapped NOS: IES/N9443)	36. Construct cavity walls, setting out both leaves, provision of wall ties and use of cavity rods. (25 hrs.)	<ul style="list-style-type: none"> <li>• Cavity wall: Technical terms, advantages, constructional details, precautions to be taken at the bottom of cavity. 4HRS</li> </ul>
Professional Skill 50 Hrs; Professional Knowledge 10 Hrs	Perform Laying out of building plan, diagonal check-up, fixing up of excavation lines. (Mapped NOS: CON/N0143)	<p>37. Setting out a building: Obtaining first, second, third &amp; fourth lines, marking diagonals, setting out cross walls &amp; offsets. (30 hrs.)</p> <p>38. Marking excavation lines &amp; fixing of plinth &amp; floor levels. (20 hrs.)</p>	<ul style="list-style-type: none"> <li>• Steps in setting out &amp; marking centre line, excavation line &amp; other lines-use of deadman-checking accuracy &amp; precautions. Windows &amp; ventilators: Including steel windows &amp; ventilators, fixtures &amp; fastenings used. (10 hrs)</li> </ul>
Professional Skill 70 Hrs;	Perform wall & ceiling plastering with application of	39. Plastering of walls- setting of spots-applying mortar-use of screeds	<ul style="list-style-type: none"> <li>• Plastering: Tools used, necessity of screeds &amp; their fixing,</li> </ul>

<p>Professional Knowledge 12 Hrs</p>	<p>mortar, smoothing the surface by using of screeds &amp; floats. (Mapped NOS: CON/N0111)</p>	<p>&amp;floats. (25 hrs.)            40. Fixing of screeds to soffits of door &amp; window openings-reversing the screeds &amp; squaring. (20 hrs.)            41. Plastering of ceiling: Application of mortar, strengthening and finishing (Improvise a roof with stone or concrete slab for the purpose of demonstration). (25 hrs.)</p>	<ul style="list-style-type: none"> <li>• Steps in plastering.</li> <li>• Concrete: Ingredients, selection of materials, various ratios of mix, their uses, measuring of materials for mixing. (12 hrs)</li> </ul> <p>VIDEO CHAPTER -5</p>
<p>Professional Skill 50 Hrs;  Professional Knowledge 07Hrs</p>	<p>Make different types of floor with determination and formation of Slope. (Mapped NOS: IES/N9444)</p>	<p>42. Flooring practice: Determination and formation of slope, application of slurry for finishing, setting out of skirting, formation of spots for skirting. (30 hrs.)            43. Use of screeds, formation of curve at the junction of skirting &amp; floor. (20 hrs.)</p>	<ul style="list-style-type: none"> <li>• Floors: Types, constructional details such as consolidation of bed, sand filling, concrete base &amp; finishing. Granolithic flooring. Local Municipal byelaws. (07 hrs)</li> </ul>
<p>Professional Skill 100 Hrs;  Professional Knowledge 20 Hrs</p>	<p>Lay drain pipe, jointing, fittings &amp; fixing of W.C. pan, urinals, gully trap. Construction of manhole etc. (Mapped NOS: IES/N9445)</p>	<p>44. Drainage: Set out a drainage line including position of manhole &amp; gully trap. (22hrs.)            45. Practice in setting up and reading of dumpy level. (16 hrs.)            46. Lay out drainage to required gradients with the help of dumpy level and/or boning rod and laying its surface with bricks. (26 hrs.)            47. Laying of concrete foundation for drainage pipes and jointing. Checking of alignment.</p>	<ul style="list-style-type: none"> <li>• Purpose of drainage, different systems, their advantages &amp; disadvantages, method of collection, carriage &amp; final disposal of wastage, various types of constructions required. Roofs: Classification, parts, trussed roof, covering materials.</li> <li>• House drainage system-normal layout of drainage.</li> <li>• Traps-gully, nahani, etc.-their description.</li> <li>• Purpose &amp; method of</li> </ul>

		<p>Cutting the pipe to the required length. (10 hrs.)</p> <p>48. Covering of drain pipe with concrete as per PWD specification. (4hrs.)</p> <p>49. Laying out foundation concrete and construction of manhole. (12hrs.)</p> <p>50. Method of providing footrests, Forming of drain and benching.(10 hrs.)</p>	<p>fixing sanitary fittings such as WC, urinal, washbasin, kitchen sink, etc.</p> <ul style="list-style-type: none"> <li>• Construction of surface drains and laying its surface with bricks.</li> <li>• Drainage pipes: Types, materials, sizes, gradient for different diameters, method of laying &amp; jointing, importance of water tightness, concrete base and covering. (20 hrs)</li> </ul>
<p>Professional Skill 50 Hrs;</p> <p>Professional Knowledge 06 Hrs</p>	<p>Construct septic tank. (Mapped NOS: IES/N9446)</p> <p>Perform fixing&amp; fittings of wash basin, flushing cistern, sink, vent pipe, etc. (Mapped NOS: IES/N9447)</p>	<p>51. Construct Septic tank conforming PWD norms, Bonding &amp;waterproofing of tank walls, lining field drains with bricks. Shoring for deep trenches following proper Safety precautions. (30 hrs.)</p> <p>52. Fix brackets for washbasin and flushing cistern. (06 hrs.)</p> <p>53. Fix WC pan, kitchen &amp;bathroom traps, sinks, etc. Fixing of vent pipe to walls.(14hrs.)</p>	<ul style="list-style-type: none"> <li>• Septic tank: Purpose, parts and method of construction. .(06 hrs)</li> </ul> <p>Chapter -6 video demo</p>
<p>Professional Skill 30 Hrs;</p> <p>Professional Knowledge 07Hrs</p>	<p>Lay marble on floor&amp; stair with marking, cutting &amp;complete setting. (Mapped NOS: IES/N9448)</p>	<p>54. Marble work: Method of cutting and setting on stair, floor, wall &amp;pillar. (30 hrs.)</p>	<ul style="list-style-type: none"> <li>• Marble floor: types, constructional details..(07hrs)</li> </ul>
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 12 Hrs</p>	<p>Construct circular brick wall &amp; hollow block walls. (Mapped NOS: IES/N9449)</p>	<p>55. Construct a <math>4\frac{1}{2}</math>" dia. X 9" thick circular brick wall 4 layers. (15 hrs.)</p> <p>56. Construct circular gate pillars with Brick / stone/ tile/ concrete.</p>	<ul style="list-style-type: none"> <li>• Circular walls: Details of construction. Purpose-made bricks.</li> <li>• Setting out and construction of circular gate pillars with</li> </ul>

		(10 hrs.)	<p>brick/stone/tile/concrete.</p> <ul style="list-style-type: none"> <li>• Hollow block masonry: Laying of hollow blocks for walls &amp; columns.</li> <li>• Use of structural clay tile for partition.</li> <li>• Precast concrete partition, metal lathe partition and concrete block partition.(12 hrs)</li> </ul>
<p>Professional Skill 64 Hrs;</p> <p>Professional Knowledge 15 Hrs</p>	<p>Prepare &amp; mix of concrete, formwork, cutting &amp; bending of bar, casting of roof slab, beams, lintels, stair, column etc. (Mapped NOS: IES/N9450)</p>	<p>57. Construct of roof with RCC slab and beam(64 hrs.)</p>	<ul style="list-style-type: none"> <li>• Introduction to RCC: Uses, materials, properties and formwork, bending of bars &amp; construction.</li> <li>• Reference to ISI code. Reinforced brickwork.</li> <li>• Brief description of slabs, beams, lintels, stairs, columns, etc.</li> <li>• RCC work: Mixing of concrete.</li> <li>• Laying, compacting &amp;Curing of concrete.</li> <li>• Thumb rule for percentage of reinforcement for lintels, slabs, beams &amp; columns.</li> <li>• Necessity hook &amp; cranking. Shear reinforcement. (15 hrs)</li> </ul>
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 07 Hrs</p>	<p>Cut &amp; set glazed tiles to walls. (Mapped NOS: IES/N9451)</p>	<p><b>Finishing works :</b></p> <p>58. External/internal wall finishing practice by plastering or Pointing. (10 hrs.)</p> <p>59. Fixing cement concrete jelly.(2 hrs.)</p> <p>60. Laying of glazed tiles.(08 hrs.)</p> <p>61. Fixing the thread, filling between ends, plumbing, setting out a jamb, bonding.(3 hrs.)</p>	<ul style="list-style-type: none"> <li>• Method of finishing-factors to be kept in mind, PWD specification on the above.</li> <li>• Use of glazed tiles for wall facing, steps in fixing, precautions.</li> <li>• Construction &amp; expansion joints-method of filling-repair of cracks.(07 hrs)</li> </ul>

		62. Marking & cutting tiles.(2 hrs.)	
Professional Skill 50 Hrs; Professional Knowledge 14 Hrs	Lay mosaic, terrazzo & tile flooring. (Mapped NOS: IES/N9452)  Perform Construction of R.C.C. & Brick stairs. (Mapped NOS: IES/N9453)	63. Flooring: Mosaic, terrazzo, and tile flooring. (30 hrs.) 64. Laying out a stair on the ground.(20 hrs.)	<ul style="list-style-type: none"> <li>• Stairs: Technical terms, relation between tread &amp; rise,</li> <li>• Types of stairs, construction details of brick, stone &amp; RCC stairs.</li> <li>• Spiral stairs with precast concrete steps.</li> <li>• Formwork &amp; shuttering-their removal-precautions-PWD specifications.(14 hrs)</li> </ul>
<b>Engineering Drawing: 40 Hrs.</b>			
Professional Knowledge ED- 40 Hrs.	Read and apply engineering drawing for different application in the field of work. (Mapped NOS: IES/N9454)	<p><b><u>ENGINEERING DRAWING:</u></b></p> <p>Introduction to Engineering Drawing and Drawing Instruments –</p> <ul style="list-style-type: none"> <li>• Conventions</li> <li>• Sizes and layout of drawing sheets</li> <li>• Title Block, its position and content</li> <li>• Drawing Instrument</li> </ul> <p>Free hand drawing of –</p> <ul style="list-style-type: none"> <li>• Geometrical figures and blocks with dimension</li> <li>• Transferring measurement from the given object to thesketches.</li> <li>• Free hand drawing of hand tools and measuring tools.</li> </ul> <p>Drawing of Geometrical figures:</p> <ul style="list-style-type: none"> <li>• Angle, Triangle, Circle, Rectangle, Square, Parallelogram.</li> <li>• Reading of dimension and Dimensioning Practice.</li> </ul> <p>Symbolic representation –</p> <ul style="list-style-type: none"> <li>• Different symbols used in the trades.</li> </ul> <p>Reading of Plan drawing</p>	
<b>Workshop Calculation Science: 36 Hrs.</b>			
Professional Knowledge WCS- 36 Hrs.	Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (Mapped NOS:	<p><b><u>WORKSHOP CALCULATION &amp; SCIENCE:</u></b></p> <p><b>Unit, Fractions</b></p> <p>Classification of unit system</p> <p>Fundamental and Derived units F.P.S, C.G.S, M.K.S and SI units</p> <p>Measurement units and conversion</p> <p>Factors, HCF, LCM and problems</p> <p>Fractions - Addition, subtraction, multiplication &amp; division</p>	

	<p>IES/N9455)</p>	<p>Decimal fractions - Addition, subtraction, multiplication &amp; division          Solving problems by using calculator  <b>Square root, Ratio and Proportions, Percentage</b>          Square and square root          Simple problems using calculator          Applications of Pythagoras theorem and related problems          Ratio and proportion          Ratio and proportion - Direct and indirect proportions          Percentage          Percentage - Changing percentage to decimal and fraction  <b>Material Science</b>          Types of metals, types of ferrous and non ferrous metals          Physical and mechanical properties of metals          Introduction of iron and cast iron  <b>Mass, Weight, Volume and Density</b>          Mass, volume, density, weight and specific gravity          Related problems for mass, volume, density, weight and specific gravity  <b>Heat &amp; Temperature and Pressure</b>          Concept of heat and temperature, effects of heat, difference between heat and temperature, boiling point &amp; melting point of different metals and non-metals          Scales of temperature, Celsius, Fahrenheit, Kelvin and conversion between scales of temperature          Co-efficient of linear expansion and related problems with assignments          Thermal conductivity and insulators  <b>Mensuration</b>          Area and perimeter of square, rectangle and parallelogram          Area and perimeter of Triangles          Area and perimeter of circle, semi-circle, circular ring, sector of circle, hexagon and ellipse          Surface area and volume of solids - cube, cuboid, cylinder, sphere and hollow cylinder          Finding the lateral surface area, total surface area and capacity in litres of hexagonal, conical and cylindrical shaped vessels  <b>Trigonometry</b>          Measurement of angles          Trigonometrical ratios</p>
<p><b><u>In plant training/ Project work</u></b>  <b>Broad areas:</b>          a) Install a W.C. pan.</p>		

# **Annexure-IV**

**Syllabus for the Trade Test**

**&**

**Competitive Written Examination**

**Post Code: TE-10**

**7.TRADE SYLLABUS**

<b>SYLLABUS FOR CARPENTER TRADE</b>			
<b>DURATION: ONE YEAR</b>			
<b>Duration</b>	<b>Reference Learning Outcome</b>	<b>Professional Skills (Trade Practical) With Indicative Hours</b>	<b>Professional Knowledge (Trade Theory)</b>
Professional Skill 50Hrs;  Professional Knowledge 14 Hrs	Identify timber/ wood, apply measuring, marking and testing instrument and holding & supporting hand Tools following safety precautions.	<ol style="list-style-type: none"> <li>1. Demonstrate first aid, fire safety equipment, different types of fire extinguisher and their application. (10hrs.)</li> <li>2. Identification of different wooden sample piece i.e. - soft wood &amp; hard wood, wooden grains etc. &amp; their applications. (04hrs.)</li> <li>3. Identification of wooden sample piece (Annual ring, knots, shakes &amp; chicks etc.). (03hrs.)</li> <li>4. Demonstrate use of hand operated tools and showing different audio-visual clips. (08 hrs.)</li> </ol>	<ul style="list-style-type: none"> <li>• Introduction of carpentry trade.</li> <li>• General discipline, workshop discipline &amp; Housekeeping.</li> <li>• Safety precaution in the workshop and industrial safety.</li> <li>• Importance of P.P.E, Types of PPE and their application.</li> <li>• Introduction of timber, growth of timber trees, cross-section of exogenous tree trunk, types of tree, different part of a tree, Soft &amp; hard wood, their differences.(07 hrs)</li> </ul>
		<ol style="list-style-type: none"> <li>5. Identification and use of different types of the measuring, marking and testing tools &amp; their applications. (10hrs.)</li> <li>6. Identification and use of different types of work holding devices. (06hrs.)</li> <li>7. Demonstrate use of machinery and hand operated portable tools and their safety. (09 hrs.)</li> </ol>	<ul style="list-style-type: none"> <li>• Common Indian timbers.</li> <li>• Defects in timber, diseases of timber, knots, shakes, grains etc.</li> <li>• Introduction of carpentry hand tools, classification and uses of marking, work holding devices.</li> <li>• Measuring &amp; testing tools. (07 hrs)</li> </ul>
Professional	Identify and apply	8. Demonstrate the use of	• Type of bench vice and their

<p>Skill 25 Hrs; Professional Knowledge 07 Hrs</p>	<p>various saws and portable power saw machines for Ripping, cross cutting, Oblique sawing and curve cutting etc.</p>	<p>bench vice, bench hook, bench stop&amp; their application. (02 hrs.)</p> <p>9. Demonstrate different types of saws- ripping, cross cutting, curve cutting, oblique sawing. (06 hrs.)</p> <p>10. Use and practice Portable power circular saw. (04hrs.)</p> <p>11. Sharpen and set different type saw blade. (05 hrs.)</p> <p>12. Demonstrate the use of country drill, hand drill, ratchet brace, Breast drill and hand augers &amp; bits. (04hrs.)</p> <p>13. Demonstrate the use of portable electrical drill machine. (02hrs.)</p> <p>14. Demonstrate the Auger application. (02hrs.)</p>	<p>uses.</p> <ul style="list-style-type: none"> <li>• Introduction of different saw and their uses.</li> <li>• Introduction of power circular saw and its use.</li> <li>• Type of special saw and its uses i.e. -compass saw, coping saw, bow saw, fret saw.</li> <li>• Saw sharpening and sharpening tools.</li> <li>• Description of boring tools - Types, Parts, functions, size and application.</li> <li>• Description of portable electrical drill machine.</li> <li>• Drill bits, types, sizes etc.</li> <li>• Hand augers description, sizes of augers, application of hand augers.</li> </ul> <p>(07 hrs)</p>
<p>Professional Skill 25 Hrs; Professional Knowledge 07 Hrs</p>	<p>Analyze the surface finish with exact sizing by planning operation, identifying and applying various shaving tools or portable power planning machine.</p>	<p>15. Planning face, face edge. (04 hrs.)</p> <p>16. Demonstrate the use of marking, mortise gauge etc. (04 hrs.)</p> <p>17. Test the accuracy of flatness and twistness of the surface by using try square. (04hrs.)</p> <p>18. Demonstrate the use of winding strips, cross planning, edge planning. (04hrs.)</p> <p>19. Grinding and Sharpening process of the planer blade/cutter. (05 hrs.)</p> <p>20. Demonstration of portable power planer machine and its function. (04 hrs.)</p>	<ul style="list-style-type: none"> <li>• Type of different planes and their proper uses in woodwork - Description, function and its size, setting, knowledge of sharpening and uses etc.</li> <li>• Knowledge of using marking gauges.</li> <li>• Important instruments necessary for checking flatness and twistness of surface.</li> <li>• Sharpening and grinding angle of cutter.</li> <li>• Portable power planer - useful in modern woodwork and new technology design.</li> </ul>

			(07 hrs)
Professional Skill 25 Hrs;  Professional Knowledge 07 Hrs	Identify and apply various paring tools and analyze and choose the positioning and employ holding device for chiselling with better finish.	<p>21. Demonstrate the use of different types of chisel, chiselling, chiselling along&amp; across the grain. (08hrs.)</p> <p>22. Grind/ sharpen and honing of a chisel. (08hrs.)</p> <p>23. Demonstrate use of different types of striking tool, hammer and mallets. (04hrs.)</p> <p>24. Demonstrate the use of clamps 'G' or 'C', saw sharpening vice, carpentry vice etc. (05hrs.)</p>	<ul style="list-style-type: none"> <li>• Different type chisels - Definition, identification, their uses.</li> <li>• Necessity of grinding and sharpening.</li> <li>• Striking tools- Definition, types, application.</li> <li>• Files - Types, uses</li> <li>• Care &amp; maintenance of files</li> <li>• Function of work bench, bench vice, bench hook, etc. (07 hrs)</li> </ul>
Professional Skill 100Hrs;  Professional Knowledge 28Hrs	Identify and classify various types of joints, analyze and prepare correct joint at correct position, related with strength and appearance.	<p><b><u>Demonstration and making framing joint</u></b></p> <p>25. Single Mortise and tenon Joint. (04hrs.)</p> <p>26. Double tenon &amp; mortise joint. (04hrs.)</p> <p>27. Plain hunched tenon and mortise joint. (04 hrs.)</p> <p>28. Mitre corner tenon &amp; mortise joint. (04hrs.)</p> <p>29. Task tenon mortise joint. (04 hrs.)</p> <p>30. Bare faced tenon joint. (05hrs.)</p>	<ul style="list-style-type: none"> <li>• Seasoning of timber - Definition, advantage and disadvantage of seasoning.</li> <li>• Moisture content in timber and its effect on timber.</li> <li>• Characteristics of wood, physical and mechanical properties of wood.</li> <li>• Quality of good timber.</li> <li>• Define the classification of wooden joint.</li> <li>• Description of different types joint.</li> <li>• Uses of joint: Framing joint angle joint and lengthening joint etc. (07 hrs)</li> </ul>
		<p><b><u>Demonstration and making Housing joints</u></b></p> <p>31. Full housing joint. (03 hrs.)</p> <p>32. Bridle joint etc. (03hrs.)</p> <p>33. Stopped housing joint. (04 hrs.)</p> <p>34. Dovetail housing joint. (03 hrs.)</p>	<ul style="list-style-type: none"> <li>• Preservation of timber.</li> <li>• Application of different types of preservation &amp; Process of each treatment.</li> <li>• Definition of housing joint.</li> <li>• Different type of housing joint.</li> </ul>

		<p><b><u>Demonstration and making dovetail joint</u></b></p> <p>35. Single dovetail joint. (03 hrs.)</p> <p>36. Common dovetail joint. (03 hrs.)</p> <p>37. Lapped dovetail joint. (03 hrs.)</p> <p>38. Secret mitre dovetail joint uses of dovetail template. (03 hrs.)</p>	<ul style="list-style-type: none"> <li>• Uses of housing joint.</li> <li>• Description of different dovetail joint and their function.</li> <li>• Uses of dovetail joint.</li> <li>• Glues - Types of glue and their uses. (07 hrs)</li> </ul>
		<p><b><u>Demonstration and Making broadening joints</u></b></p> <p>39. Simple butt joint by hard wood (100 mm width and 15mm thick). (02 hrs.)</p> <p>40. Riveted butt joint on hard wood (100mm width and 25mm thick). (04 hrs.)</p> <p>41. Pocket screw butt joint on hard wood (100mm width and 15mm thick). (03 hrs.)</p> <p>42. Secret pocket screw butt joint on teak wood or hard wood (100mm width and 100mm thick). (06 hrs.)</p> <p>43. Glued butt joint with dowel by a hard wood (100mm width and 15mm thick). (04 hrs.)</p> <p>44. Tongue and groove joint on hard wood (100mm width and 15mm thick). (06 hrs.)</p>	<ul style="list-style-type: none"> <li>• Broadening joint description.</li> <li>• Types of broadening joint.</li> <li>• Application of broadening joint.</li> <li>• Setting of end side according to annual Rings as well as matching the grain stranding.</li> <li>• Advantage of adhesives use and their types.</li> <li>• Method of Dowel application. (07 hrs)</li> </ul>
		<p><b><u>Making lengthening joint</u></b></p> <p>45. End half lap joint on hard wood (50mm X 50mm). (02hrs.)</p> <p>46. End over lap joint by hard wood 150mm X 25mm. (01</p>	<ul style="list-style-type: none"> <li>• Lengthening joint description.</li> <li>• Types of lengthening joint.</li> <li>• Application of different lengthening joint.</li> <li>• Setting of two tapper</li> </ul>

		<p>hr)</p> <p>47. End bends lap joint on hard wood (50mm X25mm). (02 hrs.)</p> <p>48. Table scrat joint on hard wood (50mm X 50m). (03 hrs.)</p> <p>49. Too then end table &amp; scarf joint on hard wood (50mm X 50m). (04 hrs.)</p> <p>50. Bend scarf joint on teak wood or hard wood (50mm X 50m). (03 hrs.)</p> <p><b><u>Making of Frame using different type of joints –</u></b></p> <p>51. Stopped Tenon &amp; mortise Joint on hard wood to make tea table frame to lock four legs, top rail and bottom rails. (04 hrs.)</p> <p>52. Lapped half lap dovetail joint on bottom rails on hard wood. (03 hrs.)</p> <p>53. Tongue &amp; Groove joint on tabletop by hard wood as a broadening joint. (03 hrs.)</p>	<p>wedges.</p> <ul style="list-style-type: none"> <li>• Advantages of table &amp; scarf joint.</li> <li>• Veneer, Plywood</li> <li>• Types of plywood</li> <li>• Advantage of plywood</li> <li>• Application of plywood, block board, laminated board, hard board, insulation board, mica etc. (07 hrs)</li> </ul>
<p>Professional Skill 125 Hrs;  Professional Knowledge 35Hrs</p>	<p>Make small wooden job as per drawing with schedule sizes of timber or alternatives of timber i.e. FRP, MDF, FOAM using various hardware.</p>	<p><b><u>Make small wall bracket –</u></b></p> <p>54. Make joint on hard wood to make small frame. (03hrs.)</p> <p>55. Stopped Tenon &amp; Mortise joint on hard wood in the frame to set the selves. (02hrs.)</p> <p>56. Make selves by six pieces of hard wood with single lapped half lap dovetail joint with frame (two nos. of selves). (05 hrs.)</p> <p>57. Four sides of chalk box.</p>	<ul style="list-style-type: none"> <li>• Parts &amp; terms of portable disc sander.</li> <li>• Application of portable disc sander.</li> <li>• Care &amp; maintenance of disc sander.</li> <li>• Method of making a wooden partition.</li> <li>• Door frames.</li> <li>• Door &amp; window panels. (07 hrs)</li> </ul>

		<p>(100mm X 120mm X 100mm) locked with hard wood by common dovetail joint (3 pin). (05 hrs.)</p> <p>58. Grooves on three sides. (02 hrs.)</p> <p>59. Make the lid &amp; base with Masonite with handle levelled with top. (02 hrs.)</p> <p>60. Common dovetail joint apply to lock four sides of tray (400mm X 300mm X 200mm). (04 hrs.)</p> <p>61. Bases made with ply wood (5mm thick) and make the handle. (02 hrs.)</p>	
		<p>62. Layout of stool and make cutting List for mass production. (05hrs.)</p> <p>63. Prepare standard height taper legged stool as per layout. (05hrs.)</p> <p>64. Demonstrate application of adhesive. (05 hrs.)</p> <p>65. Layout making for notice board or display board by hard board, plywood and insulation board. (05 hrs.)</p> <p>66. Making a small rack by layout with hard wood and plywood. (05 hrs.)</p>	<ul style="list-style-type: none"> <li>• Calculation of timber required for stool.</li> <li>• List out the sequence of operation of the job.</li> <li>• Timbers used in furniture work – describe Sal, teak, gamar, pine, deodar etc.</li> <li>• Properties and characteristics of different furniture wood. (07 hrs)</li> </ul>
		<p>67. Make Frame structure with the block board, layout as per the size and cutting by portable circular saw machine with Common dovetail joint used in the structure. (12 hrs.)</p> <p>68. Painting and polishing or</p>	<ul style="list-style-type: none"> <li>• Conversion and types of conversion.</li> <li>• Parallel sawing Radial sawing Quarter sawing Tangential sawing Process and advantage</li> <li>• Design of wooden wall unit</li> </ul>

		<p>fixing sun mica with adhesive. (08 hrs.)</p> <p>69. Setting glasses and hard works as on required location. (05 hrs.)</p>	<p>uses in bed room, dining hall, library, office, workshop classroom. (07 hrs)</p>
		<p>70. Make a small table use of lock, hinges, hasp and staple etc. making a small box with sun mica top. (Mortise and tenon joint. 'T' half tap dovetail joint. Secret dovetail joint). (20 hrs.)</p> <p>71. Uses sun mica and pest on the top of table. (05 hrs.)</p>	<ul style="list-style-type: none"> <li>• Uses of joint for small table to stranger strength.</li> <li>• Manufacturing process of various boards and sheets.</li> <li>• Types of hinges, Uses of hinges</li> <li>• Types of door lock &amp; their different uses. (07 hrs)</li> </ul>
		<p><b><u>Demonstration on nailing screwing on job</u></b></p> <p>72. Use selected nail for the table and small box. (12 hrs.)</p> <p>73. Use selected screw for the table and small box. (08 hrs.)</p> <p>74. Application of different types of Nails, screws etc. (05 hrs.)</p>	<p>Nails and screws –</p> <ul style="list-style-type: none"> <li>• Nail and screws – type, Uses etc.</li> <li>• Nut, bolts and washer - types and Uses</li> <li>• Lock hinges hasp and staple.</li> <li>• Knowledge of other fittings – types, sizes and lenses. (07 hrs)</li> </ul>
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 07 Hrs</p>	<p>Analyze and identify various carving tools and convert a wooden block/ piece into a decorative article.</p>	<p>75. Demonstrate wood carving using carving tools, sharpen carving tools and finish by smoothing. (25 hrs.)</p>	<ul style="list-style-type: none"> <li>• Description of different carving tools.</li> <li>• Tools required for ornamental carving.</li> <li>• Properties of wood.</li> <li>• Preparation a bill of materials.</li> <li>• Estimate the material. (07 hrs)</li> </ul>
<p>Professional Skill 50 Hrs;</p> <p>Professional Knowledge 14 Hrs</p>	<p>Demonstrate preservation of wooden item through surface finishing with various processes such as Painting,</p>	<p>76. Prepare surface for Painting. (04 hrs.)</p> <p>77. Apply paints. (03 hrs.)</p> <p><b>Varnish surface of woodwork</b></p> <p>78. Prepare surface for varnishing by smoothing plane. (04 hrs.)</p>	<ul style="list-style-type: none"> <li>• Paints, ingredients of paints.</li> <li>• Name of the agent of paints.</li> <li>• Method of preparation of surface for staining.</li> <li>• Necessary tools and equipment required for</li> </ul>

	polishing & varnishing etc.	79. Smoothing plane on knotty and interlocked cross grained. (04 hrs.) 80. Smoothen surface by scraping with sandpaper or portable sander machine. (06 hrs.) 81. Varnish on finished surface. (04 hrs.)	staining. <ul style="list-style-type: none"> <li>• Uses of different grade sandpaper.</li> <li>• Portable sander machine - uses</li> <li>• Preparation of putty and use.</li> <li>• Staining – type, process, methods applied for different timber. (07 hrs)</li> </ul>
		<b>Polishing of Furniture –</b> 82. Cleaning of furniture surface. (04hrs.) 83. Application of French polish. (06hrs.) 84. Application of wax polishes. (06hrs.) 85. Remove old polish and re-polish old furniture. (05hrs.) 86. Prepare an estimation of wooden furniture. (04hrs.)	<ul style="list-style-type: none"> <li>• Description &amp; method of French polish.</li> <li>• Method of wax polish and its uses.</li> <li>• Methods of old furniture re-polish.</li> <li>• Estimation process of wooden furniture. (07 hrs)</li> </ul>
Professional Skill 75 Hrs;  Professional Knowledge 21 Hrs	Demonstrate ripping, cross cutting, curve cutting etc. on band saw/ circular saw machine and grinding and setting of blade/ cutter.	87. Demonstrate band saw machine with different parts & their functions. (07 hrs.) 88. Demonstration to the safety precaution with operational techniques. (07 hrs.) 89. Remove and refit band saw blades. (03 hrs.) 90. Grinding and setting operation of band saw blade. (08 hrs.)	<ul style="list-style-type: none"> <li>• Describe constructional features of band saw machine.</li> <li>• Types of band saw machine.</li> <li>• Sizes of band saw machine.</li> <li>• Parts of band saw machine.</li> <li>• Function of band saw machine.</li> <li>• P.P.E for band saw machine (07 hrs.)</li> </ul>
		91. Ripping & cross cutting operation on band saw machine with hard wood. (07 hrs.) 92. Curve cutting operation on hard board or soft wood or ply board by band saw machine. (08 hrs.)	<ul style="list-style-type: none"> <li>• Operation of band saw machine.</li> <li>• Safety precaution of bad saw machine.</li> <li>• Care &amp; maintenance of band saw machine with oiling &amp; greasing. (07 hrs)</li> </ul>

		<p>93. Bevelling operation on hard wood/ soft wood. (05 hrs.)</p> <p>94. Chamfering operation on hard wood/ soft wood/ ply board by bend saw machine. (05 hrs.)</p>	
		<p>95. Demonstrate circular saw machine, its parts and their operational techniques with safety precaution. (04 hrs.)</p> <p>96. Remove and refit of circular saw blade. (02 hrs.)</p> <p>97. Grinding and setting operation of the circular saw blade. (04 hrs.)</p> <p>98. Ripping &amp; cross cutting operation on hard wood/ soft wood/ ply wood (not less than 12 mm) by circular saw machine. (04hrs.)</p> <p>99. Rebating &amp; grooving operation on hard wood/ soft wood by circular saw machine. (04 hrs.)</p> <p>100. Mitering operation on hard wood/ soft wood/ plywood (not less than 12 mm) (02 hrs.)</p> <p>101. Demonstrate portable Circular saw machine with different parts &amp; their functions. (04 hrs.)</p> <p>102. Remove and refit of saw blade. (01 hr.)</p>	<ul style="list-style-type: none"> <li>• Describe circular saw machine.</li> <li>• Types of circular saw machine.</li> <li>• Sizes of circular saw machine.</li> <li>• Identify the parts of circular saw machine.</li> <li>• Function of circular saw machine.</li> <li>• Different types of saw blades used in circular saw machine.</li> <li>• Safety precaution of circular saw machine.</li> <li>• Care &amp; maintenance of circular saw machine with oiling &amp; greasing.</li> <li>• Operation of portable type circular saw machine.</li> <li>• Safety precautions</li> <li>• P.P.E for the circular saw machine (07 hrs)</li> </ul>
Professional Skill 50 Hrs; Professional Knowledge	Demonstrate different operations on Jointer/surface Planer/Thickness	103. Demonstrate Jointer/surface Planer machine, its parts and their operational techniques and safety precaution. (06 hrs.)	<ul style="list-style-type: none"> <li>• Describe of planning machine.</li> <li>• Types of planning machine.</li> <li>• Sizes of planning machine.</li> <li>• Parts of surface/thickness</li> </ul>

<p>14 Hrs</p>	<p>planer machine along with sharpening blades. (Range of operations – Surfacing, thickening, chamfering, edge bending etc.)</p>	<p>104. Remove and refit of cutter of planing machine. (04 hrs.) 105. Sharpening and honing operation of cutter of planing machine. (15 hrs.) 106. Surfacing operation on hard wood/ soft wood by planing machine. (06hrs.) 107. Thickness operation on hard wood/ soft wood by planing machine. (06hrs.) 108. Chamfering Operation (06hrs.) 109. Edge bending operation on hard wood/ soft wood by planing machine. (07hrs.)</p>	<p>planing machine.</p> <ul style="list-style-type: none"> <li>• Function of surface/ thickness planing machine.</li> <li>• P.P.E for the surface/ thickness planing machine. (07 hrs)</li> <li>• Operation of surface / thickness planing machine.</li> <li>• Safety precaution of surface / thickness planing machine.</li> <li>• Care &amp; maintenance of surface / thickness planing machine</li> <li>• Oiling &amp; greasing. (07 hrs)</li> </ul>
<p>Professional Skill 25 Hrs; Professional Knowledge 07 Hrs</p>	<p>Demonstrate working on pedestal grinding (Range of operations – grinding of mushroom head, cutting edge of tools, drills, etc.)</p>	<p>110. Demonstrate pedestal grinding machine, its parts and their operational techniques with safety precautions. (06hrs.) 111. Demonstrate off hand grinding operation as per requirement of the trade. (07 hrs.) 112. Grind mushroom head, cutting edge of tools, drill bits and check correctness. (12 hrs.)</p>	<ul style="list-style-type: none"> <li>• Pedestal grinding machine - Description, Types, Sizes, Parts, Function, Operation of pedestal grinding machine.</li> <li>• Safety precaution and P.P.E for the pedestal grinding machine</li> <li>• Care &amp; maintenance of pedestal grinding machine with oiling &amp; greasing.(07 hrs)</li> </ul>
<p>Professional Skill 25 Hrs; Professional Knowledge 07 Hrs</p>	<p>Demonstrate working on pedestal /portable drilling machine, use of different types of drill bits, make holes of different sizes in correct location on</p>	<p>113. Demonstrate pedestal drilling machine and its parts &amp; their operational techniques and safety precaution. (06 hrs.) 114. Make different sizes of drill hole on wooden block/ job using straight/ taper shank drill bit. (10 hrs.)</p>	<ul style="list-style-type: none"> <li>• Pedestal drilling machine - Description, Types, Sizes, Parts, Function, Operation of pedestal drilling machine.</li> <li>• Safety precaution and P.P.E for the pedestal drilling machine</li> <li>• Care &amp; maintenance of pedestal drilling machine</li> </ul>

	woodwork.	115. Use of counter sinking bit on job. (07 hrs.) 116. Demonstrate care & maintenance. (02 hrs.)	with oiling & greasing • Types of drill bits used in drill machine.(07 hrs)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Demonstrate different operations on wood turning lathe along with sharpening of cutting tools.	117. Demonstrate wood turning lathe, its parts & chisels sets with operational technique and safety precaution. (04 hrs.) 118. Remove, grind and refit cutting tools and set job. (04 hrs.) 119. Plain turning operation on hard wood/ soft wood by wood turning lathe. (04 hrs.) 120. Drilling, boring, taper turning operation on hard wood/ soft wood by wood turning lathe. (05 hrs.) 121. Make chisel handle, table lamp stand, etc on wood turning lathe. (05 hrs.) 122. Internal turning operation using face plate. (03 hrs.)	• Wood turning lathe – Description, Types, Sizes, Parts, Function, Types, Operation of wood turning lathe. • Safety precaution and P.P.E for wood turning lathe. • Care & maintenance of wood turning lathe with oiling & greasing. • Types and application of set of chisels • Signature of cutting tools. (07 hrs)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Demonstrate different operations on Tenon and mortise machine.	123. Demonstrate working of mortise machine, its part, their operational techniques and safety precaution. (06 hrs.) 124. Adjust table along with feed and job holding. (03 hrs.) 125. Mortising operation on hard wood/ soft wood (300mmX50 mm X 25mm). (05 hrs.) 126. Remove and refit of chain & sprocket with the machine. (05 hrs.) 127. Make groove at the face or	• Mortise machine – Description, Types, Sizes, Parts, Function, Operation of mortise machine. • Safety precaution and P.P.E formortise machine. • Care & maintenance of mortise machine with oiling & greasing • Calculation of timber, weight, area, volume etc. (07 hrs)

		edge on the job. (06 hrs.)	
Professional Skill 25 Hrs;  Professional Knowledge 07 Hrs	Demonstrate different operations on Sanding machine.	128. Demonstrate working of different types Sanding machine, its part, their operational techniques and working safety precaution. (10 hrs.)  129. Operation on hard wood/ soft wood by using sanding machine. (15hrs.)	<ul style="list-style-type: none"> <li>• Sanding machine – Description, Types, Parts of sanding machine.</li> <li>• Safety precaution and P.P.E for sanding machine. (07 hrs)</li> </ul>
Professional Skill 75 Hrs;  Professional Knowledge 21 Hrs	Identify and prepare different types of pattern, core box, core print etc. for moulding application with proper allowances and colour codes.	130. Identify pattern making hand tools (02 hrs.) 131. Use contraction rule (01hr.) 132. Demonstrate application of different type of pattern allowances. (05 hrs.) 133. Layout simple solid pattern on layout board. (03 hrs.) 134. Make pattern as per checked layout (take help of wood working machines as much as possible) on teak wood. (06hrs.) 135. Make Layout of split pattern. (03 hrs.) 136. Mark and make split pattern on teak wood. (05 hrs.)	<ul style="list-style-type: none"> <li>• Introduction of pattern</li> <li>• Different hand tool including contraction rule.</li> <li>• Different allocation</li> <li>• Different shrinkage</li> <li>• Drafting</li> <li>• Pattern allowance</li> <li>• Different types of timber used in pattern making.</li> <li>• Types of pattern and their uses.</li> <li>• Application of colour code in pattern making. (07 hrs)</li> </ul>
		137. Making dowels for split pattern. (02 hrs.) 138. Use of dowel pin and nail and screw etc. (02 hrs.) 139. Make templates by sun-mica, hard wood. (04 hrs.) 140. Make filets. (03 hrs.) 141. Layout of multi pieces pattern. (07 hrs.) 142. Mark and make multi piece pattern with teak wood as per layout and drawing. (07	<ul style="list-style-type: none"> <li>• Reading of blue print and drawing</li> <li>• Layout board and its use.</li> <li>• Dowel types, size and use in pattern making work.</li> <li>• Multi-piece pattern complication and remedy. (07 hrs)</li> </ul>

		hrs.) 143. Mark and make core and core print. (06 hrs.) 144. Prepare core box. (06 hrs.) 145. Carting pattern. (05 hrs.) 146. Positioning of core point (03 hrs.) 147. Apply Colour code on pattern, core box as per IS specification. (05 hrs.)	<ul style="list-style-type: none"> <li>• Types and uses of core and core print.</li> <li>• Colour codes specification.</li> <li>• Use of points on pattern, core, corebox is point.</li> <li>• Estimate volume of wood and other requirement for pattern making box. (07 hrs)</li> </ul>
Professional Skill 25 Hrs;  Professional Knowledge 07 Hrs	Produce component involving different operations of fitting work and check for functionality.	148. Mark and make hanging plate, corner plate, name plate, different types of clamps and angle plate by chipping, sawing filling, drilling, counter sinking etc. (14 hrs.) 149. Make nuts, bolts, washers, screws by drilling, tapping and dieing. (06hrs.) 150. Grind chisels, drills and check for correct cutting angle. (05hrs.)	<p><b><u>General safety in fitting shop</u></b></p> <ul style="list-style-type: none"> <li>• Types of marking and cutting tools and their uses. (viz., marking block, chisels, hammer, hacksaw, files, etc.)</li> <li>• Uses and maintenance of tools – Steel rule, try squares, scriber, divider, calipers and other tools. Marking table, marking block etc.</li> <li>• Application of bench vice, clamps.</li> <li>• Types of drill bits, counter boring tool, taps and dies used in fitting work.</li> <li>• Types of nuts, bolts, washers, machine screws etc. (07 hrs)</li> </ul>
Professional Skill 50 Hrs;  Professional Knowledge 14 Hrs	Produce component involving different operations of sheet metal work and check for functionality.	<p><b><u>Sheet metal work (S.M.W)</u></b></p> <p>151. Mark, cut and make various joints. (06hrs.)</p> <p>152. Develop and mark metal sheet to make simple square container as per drawing. (08hrs.)</p> <p>153. Make simple square container with wired edge</p>	<p><b><u>Common sheet metal tools –</u></b></p> <ul style="list-style-type: none"> <li>• Description, type and uses of hand tools for sheet metal work.</li> <li>• Application of various types of hammer.</li> <li>• Application of various types of stakes.</li> <li>• Development of various</li> </ul>

		<p>and riveted joint and check dimension of the product. (12hrs.)</p> <p>154. Develop and mark metal sheet to make a funnel as per drawing. (10hrs.)</p> <p>155. Make funnel as per drawing with solder joint and check dimension of the product. (14hrs.)</p>	<p>type of shape.</p> <ul style="list-style-type: none"> <li>• Development of drawing and layout simple pattern</li> <li>• Right concept of shearing, punching, folding, bending etc(14 hrs)</li> </ul>
<p>Professional Skill 100 Hrs;</p> <p>Professional Knowledge 28 Hrs</p>	<p>Prepare various roof truss, door and windows frame, shutters, assembling &amp; fixing (wooden, aluminium &amp; pvc).</p>	<p>156. Revision of basic joint related with building work. (04 hrs.)</p> <p>157. Making door shutter. (06 hrs.)</p> <p>158. Making panel door. (06 hrs.)</p> <p>159. Making door glazed shutter. (06 hrs.)</p> <p>160. Fitting moulding with glass. (03 hrs.)</p>	<ul style="list-style-type: none"> <li>• Introduction about building construction.</li> <li>• Different type door &amp; windows and different size.</li> <li>• Different type panel used for panel shutter, glazed shutter.</li> <li>• Substitute of wood viz., block board, hard board etc. (07 hrs)</li> </ul>
		<p>161. Marking and making window frame and window shutter. (06 hrs.)</p> <p>162. Use protection bar. (05 hrs.)</p> <p>163. Roof trusses layout. (06 hrs.)</p> <p>164. Make Model type king post and queen post. (08 hrs.)</p>	<ul style="list-style-type: none"> <li>• Description of window frame and shutter</li> <li>• Uses of frame and shutter of window</li> <li>• Definition of roof trusses</li> <li>• Terms of king post and queen post. (07 hrs)</li> </ul>
		<p><b><u>Prepare sliding window &amp; 'Z' battened window by aluminum channel</u></b></p> <p>165. Angular cutting of aluminium bar at different angle and size. (06 hrs.)</p> <p>166. Join angular aluminium bar by screw and modern adhesive like dendrite, feviquick etc. (06 hrs.)</p> <p>167. Aluminium channel bar joining by fibre glass (06</p>	<ul style="list-style-type: none"> <li>• Description of aluminium</li> <li>• Anodising of the aluminium windows, channel, section etc.</li> <li>• Knowledge of different aluminium section, channels required for manufacturing the windows.</li> <li>• Drilling of aluminium bar and joining by screw and adhesive.</li> </ul>

		<p>hrs.)</p> <p>168. Fiber glass shutter fitted with aluminium channel. (07 hrs.)</p>	<ul style="list-style-type: none"> <li>• Knowledge of fibre glass</li> <li>• Introduce about rubber padding /gasket and aluminium wheel.</li> <li>• Uses of channel window which is involved in building construction. (07 hrs)</li> </ul>
		<p>169. Assembling and fixing of P.V.C door for kitchen and W.C bath. (25 hrs.)</p> <ul style="list-style-type: none"> <li>• Cutting angular wise P.V.C door frame.</li> <li>• Forming shape by joining adhesive and screwing.</li> <li>• P.V.C shutter door finish by adhesive and screwing.</li> <li>• Assembling &amp; fixing the PVC door.</li> </ul>	<ul style="list-style-type: none"> <li>• Uses of P.V.C as substitute of wood.</li> <li>• Give more get-up and cheapest in price.</li> <li>• New style framing work.</li> <li>• Modern technologies follow up P.V.C moulding.</li> <li>• Advantages and disadvantages (07 hrs)</li> </ul>
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 07 Hrs</p>	<p>Paint various door, windows frame, stair and furniture (wooden or aluminum).</p>	<p>170. Removal of old painting by application of chemical paint remover. (04 hrs.)</p> <p>171. New painting for door, window stair, furniture, etc. (04 hrs.)</p> <p>172. Plain and smoothing of door &amp; window and staircase railing. (05 hrs.)</p> <p>173. Apply Synthetic enamel primer on the new surface. (08 hrs.)</p> <p>174. Apply synthetic enamel paint or oil paint on the priming surface as finishing coat. (04 hrs.)</p>	<ul style="list-style-type: none"> <li>• Apply of removing old painting by new chemical then after repainting on furniture</li> <li>• Uses of new painting and priming on furniture. (07 hrs)</li> </ul>
<p>Professional Skill 50Hrs;</p> <p>Professional Knowledge</p>	<p>Prepare various type of wooden floor, partition wall etc.</p>	<p>175. Identification of simple floor construction. (10hrs.)</p> <p>176. Use the cogged joint for wooden floors. (10hrs.)</p> <p>177. Demonstrate different type</p>	<ul style="list-style-type: none"> <li>• Purpose of using floor construction with different types of joist.</li> <li>• Basic principal of repairing work, door window,</li> </ul>

14Hrs	Check, identify, analyze and repair the wooden job.	<p>basement floor single joint wooden floor and double joint wooden floor. (10hrs.)</p> <p>178. Make structure of wooden partition wall. (10hrs.)</p> <p>179. Repair and recondition furniture, door and window, staircase hand railing. (10hrs.)</p>	<p>staircase rack etc.</p> <ul style="list-style-type: none"> <li>• Illustrate of nail screw bracket angle plate nut bolt, etc.</li> <li>• Economic factors and material estimates.</li> <li>• Hilti laser tools, types and their applications(14 hrs)</li> </ul>
<p><b>In-plant training / Project work Projects viz.</b></p> <ol style="list-style-type: none"> <li>a. Pen stand</li> <li>b. Flower vase</li> <li>c. Drawing Board</li> <li>d. Notice Board</li> <li>e. Doors</li> <li>f. Windows, etc.</li> </ol>			