

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 150Hrs; Professional Knowledge 42Hrs	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: $\pm 0.25\text{mm}$]</i>	<ol style="list-style-type: none"> 1. Importance of trade training, List of tools & Machinery used in the trade.(1 hr) 2. Safety attitude development of the trainee by educating them to use Personal Protective Equipment (PPE). (5 hrs) 3. First Aid Method and basic training.(2 hrs) 4. Safe disposal of waste materials like cotton waste, metal chips/burrs etc. (2 hrs) 5. Hazard identification and avoidance. (2 hrs) 6. Safety signs for Danger, Warning, caution & personal safety message.(1 hr) 7. Preventive measures for electrical accidents & steps to be taken in such accidents.(2 hrs) 8. Use of Fire extinguishers.(7 hrs) 9. Practice and understand precautions to be followed 	<ul style="list-style-type: none"> • Importance of safety and general precautions required for the trade. • Importance of the trade. • Types of work to be done by trainees in the institute. • Scope of a plumbing work. • Types of services have to plan. • Basic Bench fitting (07 hrs)

		<p>while working in the trade. (2 hrs)</p> <p>10. Safe use of tools and equipment used in the trade. (1 hr)</p>	
		<p>11. Use Steel rule and Steel Tape for measuring, Use Scriber and Divider for marking on 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 & Dies, Taps and Holders. (20hrs)</p>	<ul style="list-style-type: none"> Plumber's common hand tools - names, description and material from which they are made. Description, types and uses of holding device, hammers & cold chisels, cutting tools. (14 hrs)
		<p>14. Inspect raw material for rusting, scaling, corrosion etc.(2 hrs)</p> <p>15. Mark out lines, gripping suitably in vice jaws, hacksawing to given dimensions. (5 hrs)</p> <p>16. Sawing different types of metals of different sections. (5 hrs)</p> <p>17. Filing- Flat and square (Rough finish). (3hrs)</p> <p>18. Filing practice, surface filing, marking of straight and parallel lines with odd leg callipers and steel rule.</p>	<ul style="list-style-type: none"> Description of simple fitting operations hack sawing, punching and filing. Types of files used commonly. Marking instruments and their use of simple drilling machine. Method of using drills. Description of simple bench drilling Machine. Description of Grinding and Chisel. Description of different types of locking and fastening devices. (21 hrs)

		<p>(2 hrs)</p> <p>19. Marking with dividers, odd leg callipers and steel rule (circles, ARCs, parallel lines). (5 hrs)</p> <p>20. Marking off straight lines and ARCs using scribing block and dividers. (5 hrs)</p> <p>21. Chipping flat surfaces along a marked line with hammer.(5 hrs)</p> <p>22. Grinding of Chisel. (5 hrs)</p> <p>23. Marking, filing, filing square and check using tri-square.(10 hrs)</p> <p>24. Marking according to simple blue prints for locating, position of holes, scribing lines on chalked surfaces with marking tools. (10 hrs)</p> <p>25. Finding centre of round bar with the help of 'V' block and marking block. (3 hrs)</p> <p>26. Joining straight line to an ARC. (10 hrs)</p> <p>27. Punch letter and number (letter punch and number punch) (1 hr)</p> <p>28. Mark off, punch marking lines and drill through holes on M.S. flat. (4hrs)</p>	
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 07 Hrs</p>	<p>Perform Inner & Outer Thread cutting on Metal & Studs and thread cutting on different types of pipes & fittings accessories.</p>	<p>29. Thread Inner on M.S. flat by using Tap.(5hrs)</p> <p>30. Outer thread on Studs by using Die.(5hrs)</p> <p>31. Use various locking device.(5hrs)</p>	<ul style="list-style-type: none"> About different types of pipes-GI, CI, DI, PVC/CPVC, PPR, AC and HDPE etc. About different Types of Pipe Fittings:- Socket, Elbow, Tee, Union, Bend,

		32. Inner thread on Pipes by using Tap.(5hrs) 33. Outer thread on Pipe by using Die. (3hrs) 34. Fixing of different Pipe fittings in different position of Pipe. (2hrs)	Cap, Plug, Cross, Ferrule etc. <ul style="list-style-type: none"> About different types of Thread cutting. (07 hrs)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Join wood with carpenter's tools	35. Cutting wood by Sawing as per marking. (05hrs) 36. Use of Jack Plane for planning the job. (05hrs) 37. Use marking gauge for marking on job. (05hrs) 38. Make groove on wood by Firmer/ appropriate Chisel as per drawing and measurements. (05hrs) 39. Make a "T" joints as per drawing. (03 hrs) 40. Make a Cross joints as per drawing. (02 hrs)	Carpenter works :- <ul style="list-style-type: none"> Description and uses of Carpenter's hand tools used for simple operations such as marking, sawing, planning and making simple joints. Common types of wood-their description and use. (07 hrs)
Professional Skill 50Hrs; Professional Knowledge 14Hrs	Carry out cutting of Pipes of Different Dia in different angle and Joining of pipes by gas welding, Soldering and Brazing.	41. Cutting different diameter of MS pipes in different angles. (07hrs) 42. Joining of Pipe in same dia by gas welding. (05 hrs) 43. Joining of Pipes in different dia by gas welding. (05 hrs) 44. Joining of Pipes 90 degree, 45 degree and 22.50 degree angle. (05 hrs) 45. Joining of pipes for 90 degree bend by gas welding (05hrs) 46. Do some repair work by welding. (10hrs) 47. Join sheet by soldering. (05hrs)	Gas Welding :- <ul style="list-style-type: none"> Purpose of Gas welding. Method of gas welding Safety precautions to be observed -Methods of soldering and brazing - fluxes used & Types of fluxes precautions to be observed. Hard & soft solders -their properties, composition and uses. (14 hrs)

		<p>48. Brazing on Sheet. (05 hrs)</p> <p>49. Make a job by Soldering and Brazing. (03 hrs)</p>	
<p>Professional Skill 50Hrs;</p> <p>Professional Knowledge 14Hrs</p>	<p>Construct Masonry brick wall and RCC casting. Brick wall cutting for concealing pipe line.</p>	<p>50. Demonstrate proper handling of Mason's hand tools :- Straight edge, Spirit level, Plumb bob, Square, Trowel etc. (5 hrs)</p> <p>51. Setting out work with Tape, Rule, Square, Line pin and level as per drawing. (5hrs)</p> <p>52. Cutting Bricks and Stone to given size and template by cutting tools. (5hrs)</p> <p>53. Prepare Cement mortars in different proportions to suit various purposes. (5 hrs)</p> <p>54. Construct various Types of Brick wall. (5 hrs)</p> <p>55. Prepare Plane Cement Concrete and RCC in different proportions to suit various purposes. (5 hrs)</p> <p>56. RCC casting various sizes of plate. (5 hrs)</p> <p>57. Benching and Channelling of base plate. (5hrs)</p> <p>58. Damp proofing. (2 hrs)</p> <p>59. Plastering the walls. (3 hrs)</p> <p>60. Cutting of Masonry wall for concealing with Electric Cutting Tools. (5 hrs)</p>	<p>Mason's works :-</p> <ul style="list-style-type: none"> Names and description of Mason's hand tools and their uses. Method of making holes in walls and floors. Types of tools used and various Processes. Concept of bricks, lime and cement. Preparation of mortars with various materials of varying composition. Common brick joints. Description of bonds. Scaffolding & plastering. Define Plain cement concrete, RCC and its proportion, Grades of coarse aggregate and fine aggregate, Knowledge of waterproofing compound. Knowledge of Building Plan and Cross section of wall. Identify plumbing services required for each type of building according to usage. (14 hrs)
<p>Professional Skill 75 Hrs;</p> <p>Professional Knowledge 21 Hrs</p>	<p>Carry out Cutting and Bending of Pipes using Plumber's tools and equipment.</p>	<p>61. Demonstrate proper handling of Plumber's Tools & Equipment. (5hrs)</p> <p>62. Use and care of Plumber's Tools and Equipment. (15hrs)</p> <p>63. Cutting of G.I Pipes of</p>	<ul style="list-style-type: none"> Description of plumber tools and Equipment- Ratchet brace, Threading die, Pipe wrench, Sliding wrench, Spanner set, Chain Wrench etc. and their safety.

		<p>different Diameter and Sizes by cutting tools. (5 hrs)</p> <p>64. Cutting of C.I Pipe of different Diameter and Sizes by cutting tools. (10hrs)</p> <p>65. Cutting of AC Pipe of different Diameter and Sizes by cutting tools. (10hrs)</p> <p>66. Cutting of all kinds of PVC Pipe of different Diameter and Sizes by cutting tools. (5hrs)</p> <p>67. Bending of G.I Pipe as per drawing using Bending Machine up to 50 mm dia.(10 hrs)</p> <p>68. Bending of Steel Pipe as per drawing using Bending Machine up to 50 mm dia. (10hrs)</p> <p>69. Bending of PVC Pipe as per drawing using heat process up to 50 mm dia. (5 hrs)</p>	<ul style="list-style-type: none"> Care & use of tools. Pipes of different kinds Method of Pipe bending in different dia. Plumbing Symbols and Code for Tools & Materials on water line. (21 hrs)
<p>Professional Skill 25Hrs;</p> <p>Professional Knowledge 07 Hrs</p>	<p>Join Various type of PVC pipe by heat process or Welding.</p>	<p>70. Preparation of PVC pipe & Fittings in different dia. (1 hr)</p> <p>71. Preparation and precaution of Electric Hot Plate.(1hr)</p> <p>72. PVC Pipe welding various dia, using welding machine.(13hrs)</p> <p>73. Weld various type of PVC Pipe with various dia, using welding machine. (5hrs)</p> <p>74. PPR pipe welding joint</p>	<ul style="list-style-type: none"> Equipment and tools for hot gas welding and electric hot plate for PPR pipe joints. (07 hrs)

		various dia of pipe using welding machine.(5hrs)	
Professional Skill 25Hrs; Professional Knowledge 07 Hrs	Construct complete pipe line circuit with different types of Joints and fixing Cocks & valve on Pipe line.	75. CI/HCI Pipe Flange joint with Bend and Tee.(5hrs) 76. Socket joint of CI Pipes with lead. (5hrs) 77. Detachable joint of AC pressure Pipe. (5 hrs) 78. Titan/Socket & Spigot joint of Ductile Iron (DI) Pipe with Rubber ring.(4hrs) 79. Prepare and Study the drawing of Pipe line circuit and schedule use of Tools and accessories.(2hrs) 80. Make a Pipe line circuit on GI Pipe with Socket, Elbow, Bend, Flange, Tee, Union etc. And Fixing Cocks & Valves as per drawing. (4hrs)	<ul style="list-style-type: none"> Types of fittings for different joints & different pipes.:- CI,HCI,AC,AC Pressure, DI, GI Pipes. Joints:- Flange joint, Socket joint with lead, Detachable joint, Socket & Spigot joints etc. Description of pipe fittings. Methods of joining and their uses. Precautions to be taken while fixing (07 hrs)
Professional Skill 25Hrs; Professional Knowledge 07 Hrs	Carry out Cutting of Different Types of PVC Pipe, joining and laying.	81. PVC pipe cutting & shaping in various dia, using Hacksaw and Pipe cutters. (10 hrs) 82. Preparation of PVC pipe and Fittings with emery paper.(5hrs) 83. Use & fixing of PVC fittings use Solvent Cement etc. (5hrs) 84. Layout of PVC pipe according to drawing. (5hrs)	<ul style="list-style-type: none"> Different kinds of Joints, Fittings and Materials in joining pipes :- PVC/CPVC, PPR and HDPE etc. (07 hrs)
Professional Skill 25Hrs; Professional Knowledge 07 Hrs	Perform Water analysis test, Water Pressure test and Water distribution	85. Preparation of Water and Water analysis kit. (1 hr) 86. Water Analysis Test by Analysis Kits. pH, TDS,	Composition of Water :- <ul style="list-style-type: none"> Sources of water Hard & Soft water, temporary hardness

Knowledge 07 Hrs	system by using Pipe line.	<p>Temperature etc. (4hrs)</p> <p>87. Preparation of Hydraulic Pressure Test Machine. (1 hr)</p> <p>88. Static water pressure test by Hydraulic Pressure Test Machine apply on Plastic Water bottle.(4hrs)</p> <p>89. Static water pressure test by Hydraulic Pressure Test Machine apply on Cistern and Tank.(4hrs)</p> <p>90. Steps of simple pipe line connection as per drawing. (3 hrs)</p> <p>91. Make a pipe line for water distribution as per drawing. (4hrs)</p> <p>92. Make a pipe line for OHR water distribution system as per drawing. (4hrs)</p>	<p>&permanent hardness.</p> <ul style="list-style-type: none"> • Impurities of water – organic and inorganic impurities. • Water purification stages and methods. • Static water pressures and measurement of pressures. Bursting pressure, • Expansion of water on freezing and heating. • Bernoulli's principles • Pascal's law. • Pressure of water on the sides of cistern or tank. • Water hammer in pipes. (07 hrs)
Professional Skill 50Hrs; Professional Knowledge 14Hrs	Align and lay humid asbestos pipe line of different dia. and fitting & maintenance of drainage pipe line.	<p>93. Interpret drawing of sanitary plumbing. (05 hrs)</p> <p>94. Lay & align pipe. (08 hrs)</p> <p>95. Lay & align humid and asbestos pipe. (08 hrs)</p> <p>96. Demonstrate use of specific dia in different location. (04 hrs)</p> <p>97. Use various sanitary fitting. (06 hrs)</p> <p>98. Use various fitting of different materials. (06 hrs)</p> <p>99. Use joining materials of pipe. (07 hrs)</p> <p>100. Join pipe as per laid down Procedure. (06 hrs)</p>	<ul style="list-style-type: none"> • Use of hummed and asbestos pipes of different sizes. • Method of laying out pipes alignment and joining. (07 hrs) • Description of various pipe joints- straight, Branch, Taft and blow, Expansion joints. Solders and fluxes used in joints. (07 hrs)
Professional	Install and maintain	101. Demonstrate use of	• Description of Plumber's

Skill 75 Hrs; Professional Knowledge 21 Hrs	different Electric pumps.	different pump. (10 hrs) 102. Demonstrate installation of electric pump (20 hrs) 103. Demonstrate maintenance of electric pump. (10 hrs) 104. Demonstrate working process of centrifugal, reciprocating, submersible pump. (15 hrs) 105. Demonstrate delivery of water to overhead tank through pump, presser head, delivery pipe, suction pipe, etc, (15 hrs) 106. Contamination of water in a well. (05 hrs)	materials Lead, tin, Zinc, solder, copper, red lead etc. and their uses. <ul style="list-style-type: none"> Water supply system of a small town. Description and types of pumps viz. suction pump, Centrifugal pump etc. Contamination of water in a well. (21 hrs)
Professional Skill 50Hrs; Professional Knowledge 14Hrs	Join fittings for different purposes on PVC pipe line.	107. Produce metric & BSP thread on pipe. (10 hrs) 108. Produce Internal and external thread on PVC pipes of different dia. (10 hrs) 109. Join PVC pipe with thread. (06 hrs) 110. Join PVC pipe with solvent cement and heat process(10 hrs) 111. Join PVC pipe as per layout. (14 hrs)	<ul style="list-style-type: none"> Description of pipe dies, their uses, care and precaution. Metric specification of various pipes. Standard pipe threads. Method employed for bending, Joining and fixing PVC pipe. Joining material for water and gas pipes. Use of blow lamp. (14 hrs)
Professional Skill 25Hrs; Professional Knowledge 07 Hrs	Construct inspection chamber, manhole, gutter, septic tank, socket etc.	112. Demonstrate inspection chamber, manhole, gully trap, septic tank, soak pit. (04 hrs) 113. Construct inspection chambers, cesspool, septic tank, soak pit etc. (21 hrs)	<ul style="list-style-type: none"> Inspection chamber, septic tank, description of drains, cesspools, soak pits etc. Types of traps layout of drainage system (07 hrs)
Professional Skill 25Hrs;	Test pipe line as per site drainage pipe line	114. Demonstrate drawing layout of drainage pipe	<ul style="list-style-type: none"> Method of bending pipes by hot and cold process.

Professional Knowledge 07 Hrs	layout.	<p>line. (06 hrs)</p> <p>115. Perform testing for smoke test, water test, smell test, ball test mirror test. (10 hrs)</p> <p>116. Join heavy cast iron socket pipe. (03 hrs)</p> <p>117. Sealing of heavy cast iron pipe joint with lead & caulking tools. (06 hrs)</p>	<ul style="list-style-type: none"> Method of testing drainage lines (07 hrs)
Professional Skill 25Hrs; Professional Knowledge 07 Hrs	Perform removal of leakage pipe line.	<p>118. Identify location of leakage pipe. (06 hrs)</p> <p>119. Removing out leakages pipe. (10 hrs)</p> <p>120. Removing of air locks (06 hrs)</p> <p>121. Demonstrate rain water harvesting system. (03 hrs)</p>	<ul style="list-style-type: none"> 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. (07 hrs)
Professional Skill 25Hrs; Professional Knowledge 07 Hrs	Install, fix & maintain different valve & cock.	<p>122. Demonstrate different cocks & valves including materials. (04 hrs)</p> <p>123. Employ cocks & valves at different place. (06 hrs)</p> <p>124. Employ different cock & valve with sensor system. (06 hrs)</p> <p>125. Demonstrate maintenance of different cocks & valves. (06 hrs)</p> <p>126. Demonstrate use of packing washer gasket of different cock & valve. (03 hrs)</p>	<ul style="list-style-type: none"> Description of cocks & valves-their types, materials & advantages for particular work.(07 hrs)
Professional Skill 75Hrs; Professional Knowledge 21 Hrs	Install & maintain water meter and water supply for fixture.	<p>127. Demonstrate location of meter. Fitting of water meter, bath tub, wash basin. (10 hrs)</p> <p>128. Install water metre, bath</p>	<ul style="list-style-type: none"> Erecting rain water and drainage pipe system, Installation of sanitary fittings, inspection and testing of water supply system.

		<p>tub, hand wash basin, water closet urinal, sink etc with sensor system. (25 hrs)</p> <p>129. Demonstrate maintenance of water metre, bath tub, hand wash basin, water closet urinal, sink etc. (15 hrs)</p> <p>130. Demonstrate testing of water metre, Bath Tub, Hand wash basin. (10 hrs)</p> <p>131. Erect rain water and drainage pipe system. (15 hrs)</p>	<ul style="list-style-type: none"> -Pipe alignment and slope. -Prevention of water hammer. Storage tanks for general water supply propose. Test for water supply pipes. Description of sanitary fittings, general points to be observed when choosing sanitary (21 hrs)
Professional Skill 50Hrs; Professional Knowledge 14Hrs	Demonstrate method of bending for different materials & different pipe joint.	<p>132. Demonstrate bending of pipes in bending machine. (08 hrs)</p> <p>133. Bend GI pipe of different diameter in different angle. (14 hrs)</p> <p>134. Bend G.I. pipe as per drawing and measurement. (14 hrs)</p> <p>135. Bend PVC pipe of different diameter in different angle with dry sand by heating. (14 hrs)</p>	Method of bending galvanized mand other heavy pipes. (14 hrs)
Professional Skill 50Hrs; Professional Knowledge 14Hrs	Perform fitting and maintenance of Fixture at different place.	<p>136. Demonstrate process of C.I pipe cutting & joining. (12 hrs)</p> <p>137. Process of C.I. pipe fitting for waste pipe line in different section. (08 hrs)</p> <p>138. Employ Process of fixing of external soil pipe. (12 hrs)</p> <p>139. Demonstrate process of fixing of rain water gutter</p>	<p>Domestic drainage system:</p> <p>General layout, one pipe system, specifications of Materials required.</p> <p>Method of testing leakage.</p> <p>Different types of traps, ventilation, antisiphonage and sinks.</p> <p>About Fire hydrants and their fittings. (14 hrs)</p>

		outlet and ground pipe. (10 hrs) 140. Demonstrate process of measurement of waste pipe line. (08 hrs)	
Professional Skill 25Hrs; Professional Knowledge 07 Hrs	Carry out fitting, fixing & laying installation of hot & cold water pipe line and symbolizing.	141. Demonstrate working of solar water heating system. (02 hrs) 142. Analyse temperature of water (hot and cold). (02 hrs) 143. Layout pipe line for hot and cold water distribution as per drawing. (04 hrs) 144. Install pipe line for distribution of hot & cold water. (08 hrs) 145. Install hot water system & solar water heating system. (08 hrs) 146. 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. (07 hrs)
Professional Skill 25Hrs; Professional Knowledge 07 Hrs	Perform repairing & reconditioning of waste pipe line.	147. Perform fitting of different trap, valve, cistern etc. (03 hrs) 148. Demonstrate construction of over head tank as per measurement. (08 hrs) 149. Maintenance and recondition pipe line. (10 hrs) 150. Perform pressure test by hydraulic test machine. (04 hrs)	Plumbing and sanitary symbols and plumbing codes for all tools and materials (07 hrs)
Professional Skill 25Hrs;	Perform repairing & reconditioning,	151. Demonstrate cleaning of sanitary pipe line. (02 hrs)	Sensor system for urinals and was basin, etc.

Professional Knowledge 07 Hrs	scraping & painting of sanitary fittings pipe line.	<p>152. Perform cleaning of sanitary pipe line. (04 hrs)</p> <p>153. Remove corrosion from pipe line. (03 hrs)</p> <p>154. Demonstrate scraping & painting. (02 hrs)</p> <p>155. Perform scraping & painting of pipe line. (04 hrs)</p> <p>156. Maintenance of broken or cracked sanitary fitting. (05 hrs)</p> <p>157. Estimate and work out abstract cost of plumbing work as per drawing/layout. (05 hrs)</p>	<p>Corrosion - causes and remedies, prevention.</p> <p>Corrosion due to electrolytic action.</p> <p>Effect of water and frost on materials.</p> <p>Layout of pipes as per drawing.</p> <p>Analysis quantity measurement and abstract rate of plumbing and sanitary work.</p> <p>Bill of Quantity and Estimation :-</p> <ul style="list-style-type: none"> • Preparation of bill of quantity • Preparation of Estimation(07 hrs)
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SYLLABUS FOR CORE SKILLS

1. Workshop Calculation & Science(Common for one year course) (80Hrs)
2. Engineering Drawing (80Hrs)
3. Employability Skills(Common for all CTS trades) (160Hrs)

Learning outcomes, assessment criteria, syllabus and Tool List of Core Skills subjects which is common for a group of trades, provided separately in www.bharatskills.gov.in.