

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: $\pm 0.25mm$]</i> (Mapped NOS:PSC/NO133v1.0, PSC/NO132, PSC/NO134, PSC/NO135, PSC/N9901 v 1.0)	<ol style="list-style-type: none"> 1. Importance of trade training, List of tools & Machinery used in the trade. (08hr) 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. (08hrs) 4. Safe disposal of waste materials like cotton waste, metal chips/burrs etc. (05hrs) 5. Hazard identification and avoidance. (2 hrs) 6. Safety signs for Danger, Warning, caution & personal safety message. (06 hrs) 7. Preventive measures for electrical accidents & steps to be taken in such accidents. (04 hrs) 8. Use of Fire extinguishers. (7 hrs) 9. Practice and understand precautions to be followed while working in the trade. (04hrs) 10. Safe use of tools and equipment used in the trade. (1 hr) 11. Use Steel rule and Steel Tape for measuring, Use Scriber and Divider for marking on 	<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 (04hrs)
			<ul style="list-style-type: none"> • Plumber's common hand tools - names, description and material

		<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 & Dies, Taps and Holders. (20hrs)</p>	<p>from which they are made.</p> <ul style="list-style-type: none"> • Description, types and uses of holding device, hammers & cold chisels, cutting tools. • 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. (14 hrs)
<p>Professional Skill 15 Hrs;</p> <p>Professional Knowledge 06 Hrs</p>	<p>Perform Inner & Outer Thread cutting on Metal & Studs and thread cutting on different types of pipes & 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"> • About different types of pipes-GI, CI, DI, PVC/CPVC, PPR and HDPE etc. • About different Types of Pipe Fittings: - Socket, Elbow, Tee, Union, Bend, Cap, Plug, Cross, Ferrule etc. • About different types of Thread cutting. (06hrs)
<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>Gas Welding :-</p> <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

			<p>observed.</p> <ul style="list-style-type: none"> Hard & soft solders - their properties, composition and uses. (08hrs)
<p>Professional Skill 35Hrs;</p> <p>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)</p> <p>22. Setting out work with Tape, Rule, Square, Line pin and level as per drawing. (5hrs)</p> <p>23. Prepare Cement mortars in different proportions to suit various purposes. (5 hrs)</p> <p>24. Prepare Plane Cement Concrete and RCC in different proportions to suit various purposes. (5 hrs)</p> <p>25. Benching and Channelling of base plate. (5hrs)</p> <p>26. Damp proofing. (2 hrs)</p> <p>27. Plastering the walls. (3 hrs)</p> <p>28. 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. (08hrs)
<p>Professional Skill 40 Hrs;</p> <p>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 & Equipment. (05hrs)</p> <p>30. Use and care of Plumber's Tools and Equipment.</p>	<ul style="list-style-type: none"> Description of plumber tools and Equipment- Ratchet brace, Threading die, Pipe wrench, sliding wrench,

10Hrs		<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"> • 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. (10hrs)
Professional Skill 25Hrs; Professional Knowledge 08Hrs	Join Various type of PVC pipe by heat process or Welding. (Mapped NOS:PSC/NO133)	<p>36. Preparation of PVC pipe & 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"> • Equipment and tools for hot gas welding and electric hot plate for PPR pipe joints. (08hrs)
Professional Skill 25Hrs; Professional Knowledge 08Hrs	Construct complete pipe line circuit with different types of Joints and fixing Cocks & valve on Pipe line. (Mapped NOS: PSC/NO133)	<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 & 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"> • 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

		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"> • Precautions to be taken while fixing (08hrs)
Professional Skill 25Hrs; Professional Knowledge 06Hrs	Carry out Cutting of Different Types of PVC Pipe, joining and laying. (Mapped NOS: PSC/NO133)	47. PVC pipe cutting & shaping in various dia, using Hacksaw and Pipe cutters. (10 hrs) 48. Preparation of PVC pipe and Fittings with emery paper. (5hrs) 49. Use & fixing of PVC fittings use Solvent Cement etc. (5hrs) 50. 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. (06hrs)
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)	51. Preparation of Water and Water analysis kit. (1 hr) 52. Water Analysis Test by Analysis Kits. pH, TDS, Temperature etc. (4hrs) 53. Preparation of Hydraulic Pressure Test Machine. (1 hr) 54. Static water pressure test by Hydraulic Pressure Test Machine apply on Plastic Water bottle. (4hrs) 55. Static water pressure test by Hydraulic Pressure Test Machine apply on Cistern and Tank. (4hrs) 56. Steps of simple pipe line connection as per drawing. (3 hrs) 57. Make a pipe line for water distribution as per drawing. (4hrs) 58. Make a pipe line for OHR water distribution system as	<p>Composition of Water: -</p> <ul style="list-style-type: none"> • Sources of water • Hard & Soft water, temporary hardness & permanent hardness. • 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. • Description and working

		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"> • Use of hummed pipes of different sizes. • Method of laying out pipes alignment and joining. (05hrs)
		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"> • Description of various pipe joints- straight, Branch, Taft and blow, Expansion joints. Solders and fluxes used in joints. (05hrs)
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"> • Description of Plumber's materials Lead, tin, Zinc, solder, copper, red lead etc. and their uses. • Water supply system of a small town. • Description and types of pumps viz. suction pump, Centrifugal pump etc. Contamination of water in a well. (10 hrs)
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"> • 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

		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, • Installation of sanitary fittings, inspection and testing of water supply system. • -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. • Description of concealed flushing cistern (14hrs)</p>
<p>Professional Skill 50Hrs; Professional Knowledge 05Hrs</p>	<p>Demonstrate method of bending for different materials & 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 & 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>Domestic drainage system: 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.

		121. Perform scraping & painting of pipe line. (02hrs) 122. Maintenance of broken or cracked sanitary fitting. (05 hrs) 123. Estimate and work out abstract cost of plumbing work as per drawing/layout. (05 hrs)	Analysis quantity measurement and abstract rate of plumbing and sanitary work. Bill of Quantity and Estimation :- <ul style="list-style-type: none">• Preparation of bill of quantity• Preparation of Estimation(02hrs)
Engineering Drawing: 40 Hrs.			
Professional Knowledge ED- 40 Hrs.	Read and apply engineering drawing for different application in the field of work.CSC/N9401	Engineering Drawing : (40 Hrs.) Introduction to Engineering Drawing and Drawing Instruments– <ul style="list-style-type: none">• Conventions• Sizes and layout of drawing sheets• Title Block, its position and content• Drawing Instrument Free hand drawing of– <ul style="list-style-type: none">• Geometrical figures and blocks with dimension• Transferring measurement from the given object to the sketches.• Free hand drawing of hand tools and measuring tools. Drawing of Geometrical figures: <ul style="list-style-type: none">• Angle, Triangle, Circle, Rectangle, Square, Parallelogram.• Reading of dimension and Dimensioning Practice. Symbolic representation– <ul style="list-style-type: none">• Different symbols and Pipe joints used in the trade. Reading of layout plan drawing in piping	
Workshop Calculation & Science: 32 Hrs.			
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	WORKSHOP CALCULATION &SCIENCE: (32 Hrs.) Unit, Fractions 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 & division Decimal fractions - Addition, subtraction, multiplication & division Solving problems by using calculator Square root, Ratio and Proportions, Percentage Square and square root	

		<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>Material Science</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>Mass, Weight, Volume and Density</p> <p>Mass, volume, density, weight and specific gravity.</p> <p>Related problems for mass, volume, density, weight and specific gravity</p> <p>Heat & Temperature and Pressure</p> <p>Concept of heat and temperature, effects of heat, difference between heat and temperature, boiling point & melting point of different metals and non-metals</p> <p>Scales of temperature, Celsius, Fahrenheit, kelvin and conversion between scales of temperature</p> <p>Basic Electricity</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>Mensuration</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>Trigonometry</p> <p>Measurement of angles</p> <p>Trigonometrical ratios</p>
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SYLLABUS FOR CORE SKILLS

1. Employability Skills (Common for all CTS trades) (120 Hrs.)

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/dgt.gov.in