GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

COMPETENCY BASED CURRICULUM

PLUMBER

(Duration: One Year)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL: 2.5



SECTOR – PLUMBING

CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE

Kolkata-700091

PLUMBER

(Engineering Trade)

(Revised in August 2025)

Version: 3.0

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL: 2.5

Developed By

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1. COURSE INFORMATION

During the one-year duration a candidate of Plumber trade is trained on subjects Professional Skill, Professional Knowledge, and Employability Skills related to job roles. In addition to this a candidate is entrusted to make/do project work and Extra Curricular Activities to build up confidence. The practical skills are imparted in simple to complex manner & simultaneously theory subject is taught in the same fashion to apply cognitive knowledge while executing task. The practical part starts with basic pipe work viz. cutting of pipes, threading, joining, etc. and finally to fitting, fixing and laying of hot & cold water pipe line, repairing and reconditioning of waste pipe line at the end of the course. The broad components covered under Professional Skill subject are as below:

The student will gain practical knowledge about plumbing work safely with environment regulation and working practices. This course covers advancement in plumbing system and able to understand the plumbing terminology. This course provides practical knowledge of working with various plumbing tool kits and testing equipment's. This course provides knowledge to read architect or engineers plumbing drawing. Also provides selection skill of PVC pipes, composite pipes, cutting of pipes, deburring of pipes and their joining processes. This course provides understanding about pipeline circuit creation with various joints, taps, valve, and clock. In addition to understand hot and cold-water distribution system and its installation, fixing of their applications like solar system and electrical heater systems.

Also, student able to work on plumbing tools such as rainwater harvesting, fire sprinkler, water leakage testing assembly, wall chaser machine, combustible gas detector, infrared thermometer, sink auger, internal pipe cutter, advanced laser distance meter, professional Air blower, hand held Sander / polisher, laser light pen, laser distance measurement instrument, etc.

This course content covers installation, fixing, repairing and replacement of different taps, valves, faucet, water closet, bathtub, wash basin, urinals, kitchen sink etc. Also, installation and understanding the procedure of sanitary ware system and rain harvesting system.

In addition to test proper supply of water, pressure test, troubleshoot for chock-up in pipeline, inspection of proper supply to chamber, gutter, etc. Identify the leakages, dismantle and assembly of pipeline equipment for repair or replacement for providing solution to domestic as well as commercial projects also ability to create report of work and project status.

Students can work independently on concern project to gain practical knowledge of latest plumbing technologies and built confidence in this field. Students during the course, will work professionally for work on architectural plan, fitting, installation, service, and maintenance of plumbing systems.

2. TRAINING SYSTEM

2.1 GENERAL

Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under aegis of Directorate General of Training (DGT). Craftsman Training Scheme (CTS) with variantsand Apprenticeship Training Scheme (ATS) are two pioneer programmes of DGT for propagating vocational training.

Plumber trade under CTS is one of the popular courses delivered nationwide through network of ITIs. The course is of one year duration. It mainly consists of Domain area and Core area. The Domain area (Trade Theory & Practical) imparts professional - skills and knowledge, while Core area (Employability Skills) imparts requisite core skills, knowledge and life skills. After passing out of the training program, the trainee is awarded National Trade Certificate (NTC) by DGT which is recognized worldwide.

Broadly candidates need to demonstrate that they are able to:

- Read & interpret technical parameters/document, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge, core skills & employability skills while performing jobs.
- Check the job/assembly as per drawing for functioning, identify and rectify errors in job/assembly.
- Document the technical parameters related to the task undertaken.

2.2 PROGRESSION PATHWAYS

- Can join industry as Plumber and will progress further as Senior Plumber, Supervisor and can rise up to the level of Manager.
- Can become Entrepreneur in the related field.
- Can take admission in diploma course in notified branches of Engineering by lateral entry.
- Can join Apprenticeship programme in different types of industries leading to National Apprenticeship certificate (NAC).
- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming instructor in ITIs.
- Can join advanced diploma (Vocational) courses conducted by DGT as applicable.

2.3 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of one year: -

S No.	Course Element	Notional Training Hours
1	Professional Skill (Trade Practical)	840
2	Professional Knowledge (Trade Theory)	240
3	Employability Skills	120
Total		**1200**
On the Job Training (OJT)/ Group Project *		150
Optional Courses**		240
Grand Total		**1590**

** The trainee has to undergo 150 hours of mandatory OJT (On the Job Training) at nearby industry or wherever industry not available then group project has to be done with the supervision of the trade instructor for every year.*

*** Trainees of one-year or two-year trade can also opt for optional courses of up to 240 hours in each year for obtaining 10th/ 12th class certificate from NIOS along with ITI certification, or, short term courses for extra skills/knowledge.*

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his/her skill, knowledge and attitude during the period of course through formative assessment and at the end of the training programme through summative assessment as notified by the DGT from time to time.

a) The **Continuous Assessment (Internal)** during the period of training will be done by **Formative assessment method** by testing for assessment criteria listed against learning outcomes. The training institute have to maintain individual *trainee portfolio* as detailed in assessment guideline. The marks of internal assessment will be as per the formative assessment template provided on www.cstaricalcutta.gov.in or www.bharatskills.gov.in

b) The final assessment will be in the form of summative assessment. The All India Trade Test for awarding NTC will be conducted by DGT as per the guidelines. The pattern and marking structure is being notified by DGT from time to time. **The learning outcome and assessment criteria will be the basis for setting question papers for final assessment. The examiner during final**

examination will also check the individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

For the purposes of determining the overall result, weightage of 100% is applied for six months and one year duration courses and 50% weightage is applied to each examination for two years courses. The minimum pass percentage for Trade Practical and Formative assessment are 60% & for all other subjects is 33%.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking the assessment. Due consideration should be given while assessing for teamwork, avoidance/reduction of scrap/wastage and disposal of scrap/waste as per procedure, behavioral attitude, sensitivity to the environment and regularity in training. The sensitivity towards Occupational Safety, Health and Environment (OSHE) and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising some of the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work
- Computer based multiple choice question examination
- Practical Examination

Evidences and records of internal (Formative) assessments are to be preserved until forthcoming examination for audit and verification by examining body. The following marking pattern to be adopted while assessing for formative assessment:

Marks Allotted during Assessment	Performance Level	Evidence
Marks between 60% to 75%	For performance in this grade, the candidate should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and practices.	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment. • 60-70% accuracy achieved while undertaking different work with those demanded by the component/job. • A fairly good level of neatness and consistency in the finish. • Occasional support in completing the project/job.
Marks above 75% to 90%	For this grade, a candidate should produce work which demonstrates attainment of a reasonable standard of craftsmanship, with little guidance, and regard for safety procedures and practices.	• Good skill levels in the use of hand tools, machine tools and workshop equipment. • 70-80% accuracy achieved while undertaking different work with those demanded by the component/job. • A good level of neatness and consistency in the finish. • Little support in completing the project/job.
Marks Above 90%	For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	• High skill levels in the use of hand tools, machine tools and workshop equipment. • Above 80% accuracy achieved while undertaking different work with those demanded by the component/ job. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

3. JOB ROLE

Brief Description of Job Roles:

Plumber, General; lays out, assembles, installs and maintains sanitary fittings and fixtures, sewage and drainage systems, heating and sanitary systems, gas and water pipe lines etc. Receives instructions from Sanitary Engineer or Civil Engineer regarding layout of pipes, gas or water mains, position of fixtures and fittings, etc. Examines drawings or other specifications regarding size and dimensions of area where sanitary fittings or pipe are to be fitted or laid. Marks points at places to indicate position for fixing brackets and laying pipes. Drills passage holes in walls or floor of premises and fixes necessary brackets, stands, holders etc. to keep or hold fittings and fixtures in position, using nuts, bolts, clamps etc. and tightens them with hand tools. Cuts reams, threads and bends pipes as appropriate. Ensures that pipe lines are laid properly by Pipe Fitter. Joins pipes with sockets, Tees, elbow etc. or with molten lead or lead wool. Caulks joints (operation of making joint seam tight to withstand pressure) and tests them for leaks with pneumatic or hydraulic pressure. May repair and maintain sewerage and pipe lines by replacing washers on leaky faucets, mending burst pipes, opening clogged drains, etc. May do lead burning, dressing and bossing of lead pipe and sheet lead, inlaying of wooden tanks, construction of septic tanks etc.

Plumber, Operations; is responsible for operation of plumbing system used in housing, commercial and institutional setups.

Plumber, General-Installation and Repair; Plumber (General)-II is responsible for installation and repair plumbing systems including those of advanced sanitary fixtures as per manufacturer's specifications in housing, commercial and institutional setups.

Plumber, General Helper; is responsible for helping Plumber (General) by carrying and handling of tools and materials required in installation, minor repair and maintenance of plumbing systems.

Plumber, General Assistant; is responsible for assistance in, preliminary installation and minor repair work of basic plumbing systems in domestic, commercial and institutional setups.

Plumber, Maintenance and Servicing Assistant; is responsible for assistance in maintenance and servicing of pipes and sanitary fixtures in housing, commercial and institutional setups.

Plumber, Maintenance and Servicing; is responsible for assistance in maintenance and servicing of pipes and sanitary fixtures in housing, commercial and institutional setups.

Pipe Layer/Plumber Pipeline; Sewer Pipe Layer lays concrete, stone ware or clay pipes to form sanitary drains and sewers. Receives instructions regarding size and type of concrete, stone ware or clay pipe to be laid. Digs or gets earth dug along marked lines using spade, picks etc. to make trenches for laying pipes. Levels and smoothens bottom of trenches to proper gradient by

scooping with shovels. Receives pipes of required size lowered into trench manually or by pulley and adjusts their position by hand or crow-bar for correct levelling and vertical and horizontal alignment. Joints pipes together using appropriate couplings, joints, rings etc. and closes joints by caulking with fiber and cement to prevent leakage. Tests joints by hydraulic or pneumatic pressure after sealing. Fills trench with earth to cover laid pipe and rams earth to avoid sinking. Is designated as Pipe Layer Water Mains or Water Mains Fitter if engaged in laying cast iron or galvanized iron water pipe mains and in caulking their joints with lead to prevent leakage. May lay pipe lines to provide water connection to houses, sanitary sewers etc. May fix meters to stopcocks, remove defects from pipe lines and replace defective ones.

Pipe Fitter; lays, repairs and maintains, pipes for supply of water, gas, oil or steam in buildings, gardens, workshops, stores, ships etc., according to drawings or instructions. Examines drawings and other specifications or receives relevant instructions. Cuts passage holes for laying pipes in walls and floors. Cuts reams, threads and bends pipes according to specifications. Lays pipes in cut passage and assembles pipe sections with couplings, sockets, Tee's elbows etc. Levels position of pipes using sprit level for gravitational flow. Caulks joints, tests them for leakage with pneumatic or hydraulic pressure and secures pipe line to structure with clamps, brackets, and hangers. Fits water meters, taps etc. to pipe where necessary. Repairs and replaces leaky pipe lines, taps and joints and provides connections to overhead water tanks. Helps Plumber, General in fittings sanitary fittings to buildings. May join pipe sections and fittings.

Plumbers and Pipe Fitters, Other; perform number of routine and low skilled tasks such as assisting in laying pipes, making water tight joints, fitting sockets and reducers, threading pipes with taps and dies, removing leakages, etc., and are designated as Plumber Mate or Pipe Fitter Helper according to type of work done.

Plumber (Welder)/Plumbing (Sanitary Fixtures) Fitter Assistant; is responsible for welding activities related to plumbing works in housing, commercial and institutional setups.

Plumber (Welder) Assistant; is responsible for assistance in welding activities related to plumbing works in housing, commercial and institutional setups.

Plumber (Pumps and E/M Mechanic); is responsible for installation and repair of Pumps and E/M equipment used for different plumbing applications of housing, commercial and institutional Set ups.

Reference NCO-2015:

i) 7126.0101 - Plumber, General
ii) 7126.0102 - Plumber, Operations
iii) 7126.0103 - Plumber, General – Installation and Repair
iv) 7126.0104 - Plumber, General Helper
v) 7126.0105 - Plumber, General Assistant
vi) 7126.0106 - Plumber, Maintenance and Servicing Assistant
vii) 7126.0107 - Plumber, Maintenance and Servicing

viii) 7126.0201 - Pipe Layer/Plumber Pipeline
ix) 7126.9900 - Plumbers and Pipe Fitters, Other
x) 7212.0101 - Plumber (Welder)/Plumbing (Sanitary Fixtures) Fitter Assistant
xi) 7212.0102 - Plumber (Welder) Assistant
xii) 7233.1301 - Plumber (Pumps & E/M Mechanic)
xiii) 7126.0301 - Pipe Fitter

Reference NOS:

i) PSC/N9444
ii) PSC/N9446
iii) PSC/N9445
iv) PSC/N9447
v) PSC/N9448
vi) PSC/N9449
vii) PSC/N9450
viii) PSC/N9451
ix) PSC/N9452
x) PSC/N9453
xi) PSC/N9454
xii) PSC/N9455
xiii) PSC/N9456
xiv) PSC/N9457
xv) PSC/N9458
xvi) PSC/N9459
xvii) PSC/N9460
xviii) PSC/N9461
xix) PSC/N9463
xx) PSC/N9462
xxi) PSC/N9474
xxii) PSC/N9401
xxiii) PSC/N9402

4. GENERAL INFORMATION

Name of the Trade	**PLUMBER**
Trade Code	DGT/1014
NCO - 2015	7126.0101, 7126.0102, 7126.0103, 7126.0104, 7126.0105, 7126.0106, 7126.0107, 7126.0201, 7126.0301, 7126.9900, 7212.0101, 7212.0102, 7233.1301
NOS Covered	PSC/N9444, PSC/N9446, PSC/N9445, PSC/N9447, PSC/N9448, PSC/N9449, PSC/N9450, PSC/N9451, PSC/N9452, PSC/N9453, PSC/N9454, PSC/N9455, PSC/N9456, PSC/N9457, PSC/N9458, PSC/N9459, PSC/N9460, PSC/N9461, PSC/N9463, PSC/N9462, PSC/N9474, PSC/N9401, PSC/N9402
NSQF Level	Level: 2.5
Duration of the Trade	One Year
Entry Qualification	Passed 8th class Examination
Minimum Age	14 years as on first day of academic session.
Eligibility for PwD	LD, LC, DW, AA, LV, DEAF
Unit Strength (No. Of Student)	24 (There is no separate provision of supernumerary seats)
Space Norms	120 sq. m & Open Yard
Power Norms	3 KW
Instructors Qualification for:	
i) Plumber Trade	B.Voc/Degree in Civil/ Mechanical engineering from AICTE/UGC recognized Engineering College/ university with **one-year of teaching or industry experience** in the Mechanical field. **OR** 03 years Diploma in Civil / Mechanical engineering from AICTE/ recognized board of technical education with **two years of teaching or industry experience** in the Mechanical field. **OR** NTC/NAC passed in the Trade of Plumber with **three years of teaching or industry experience** in the Plumbing field. **<u>Essential Qualification:</u>** Regular/ RPL variants of National Craft Instructor Certificate (NCIC) in Plumber Trade under DGT. ***Note: Out of two Instructors required for the unit of 2 (1+1), one must have Degree/Diploma and other must have NTC/NAC***

	qualifications.
ii) Workshop Calculation & Science	B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with **one-year of teaching or industry experience.** **OR** 03 years Diploma in Engineering from AICTE / recognized board of technical education with **two years' of teaching or industry experience.** **OR** NTC/ NAC in any one of the engineering trades with **three years' of teaching or industry experience.** **Essential Qualification:** Regular / RPL variants of National Craft Instructor Certificate (NCIC) in any one of the engineering trade or RoDA.
iii) Engineering Drawing	B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with **one-year of teaching or industry experience.** **OR** 03 years Diploma in Engineering from AICTE / recognized board of technical education **two years' teaching or industry experience.** **OR** NTC/ NAC in any one of the engineering/ Draughtsman group of trades with **three years' of teaching or industry experience**. **Essential Qualification:** Regular / RPL variants of National Craft Instructor Certificate (NCIC) in any one of the engineering trades or RoDA.
iv) Employability Skill	MBA/ BBA / Any Graduate/ Diploma in any discipline with **Two years' of teaching or industry experience with short term ToT Course** in Employability Skills conducted by DGT institutions. (Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above) **OR** Existing Social Studies Instructors in ITIs with short term ToT Course in Employability Skills conducted by DGT institutions.
v) Minimum Age for Instructor	21 Years
List of Tools and Equipment	As per Annexure – I

5. LEARNING OUTCOME

Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.

5.1 LEARNING OUTCOMES

Sl. No.	NOS CODE	Learning Outcome	Duration		
			Practical	Theory	Total
FIRST YEAR					
1.	PSC/N9444	Identify and comply with the safe working practices, environmental regulation and housekeeping.	25	5	30
2.	PSC/N9446	Identify different tools, equipment's, and fittings for plumbing.	35	10	45
3.	PSC/N9445	Identify basic electrical components and simple sensors in plumbing work and prepare electrical wire joints, carry out soldering, crimping.	25	5	30
4.	PSC/N9447	Test and measure equipment's in plumbing.	45	15	60
5.	PSC/N9448	Interpret plumbing system and plumbing terminology.	25	5	30
6.	PSC/N9449	Read the plumbing drawings.	25	5	30
7.	PSC/N9450	Interpret water distribution system & demonstration of water meter.	45	15	60
8.	PSC/N9451	Install and maintain pressure in boosting pumps.	55	5	60
9.	PSC/N9452	Reduce water wastage and increase water efficiency.	20	10	30
10.	PSC/N9453	Identify, select and perform cutting of Pipes.	35	10	45
11.	PSC/N9454	Carry out joining, fitting and laying of different types of PVC Pipes.	55	5	60
12.	PSC/N9455	Install, fix and maintain different taps, valves, etc.	65	10	75
13.	PSC/N9456	Perform installation of different types of faucets, water closet and its repair.	35	10	45
14.	PSC/N9457	Carry out testing of water pressure in plumbing system.	25	5	30
15.	PSC/N9458	Install, fix and maintain sanitary ware systems and their components.	75	15	90

16.	PSC/N9459	Install, fix and maintain kitchen sink, wash basin, bathtub, etc.	75	15	90
17.	PSC/N9460	Perform rainwater, gray water harvesting and conservation.	35	10	45
18.	PSC/N9461	Carry out repairing and maintenance of plumbing system.	80	10	90
19.	PSC/N9463	Construct various brick bond for inspection chamber with multi-inlet gradients adopted for conveyance of Black Water and grey water without any obstruction various vent pipes for ventilation provided to arrest foul gas with various traps.	25	5	30
20.	PSC/N9462	Prepare and maintain the records of plumbing system.	25	5	30
21.	PSC/N9474	Install, calibrate, respond and schedule a smart water meter, smart leak detector and automated irrigation system. Troubleshoot & Diagnose with Smart Tools. Install and setup low flow devices, smart water heaters for energy efficiency and remote control.	10	5	15
22.	PSC/N9401	Read and apply engineering drawing for different application in the field of work.		30	30
23.	PSC/N9402	Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study.		30	30
		Employability Skills		**120**	**120**
		Total	**840**	**360**	**1200**

6. ASSESSMENT CRITERIA

LEARNING OUTCOMES	ASSESSMENT CRITERIA
1. Identify and comply with the safe working practices, environmental regulation and housekeeping. (NOS: PSC/N9444)	• Demonstrate use of Personal Protective Equipment (PPE). • Exhibit First Aid Method and basic training. • Precautions to be followed while working. • Demonstrate Safe use of tools and equipment used in the trade. • Exhibit use of Fire Extinguishers in case of Fire.
2. Identify different tools, equipment, and fittings for plumbing. (NOS: PSC/N9446)	• Explain in detail use of different tools and equipment's, fittings for plumbing. • Explain different fittings used in plumbing. • Perform filing, marking, sawing operations on any object using vice jaws. Explain use of threading dies and tool vice.
3. Identify basic electrical components and simple sensors in plumbing work and prepare electrical wire joints, carry out soldering, crimping. (NOS: PSC/N9445)	• Identify the different types of active electronic components. • Measure the resistor value by colour code and verify the same by measuring with multimeter. • Verify laws of series and parallel circuits with voltage source in different combinations. • Prepare terminations of cable ends • Make simple twist, married, Tee and western union joints. • Test underground cables for faults and remove the fault.
4. Test and measure equipment's in plumbing. (NOS: PSC/N9447)	• Use Wall chaser efficiently. • Demonstrate air blower. • Demonstrate Straight Grinder. • Perform pressure testing using pressure testing machine. • Demonstrate the Combustible Gas Detector. • Demonstrate use of infrared thermometer. • Demonstrate water leakage assembly testing in pipe system.
5. Interpret plumbing system and plumbing terminology. (NOS: PSC/N9448)	• Demonstrate typical plumbing system with its applications. • Identify different components of plumbing system. • Read schematic diagram of plumbing system and show all parts in it.

6. Read the plumbing drawings. (NOS: PSC/N9449)	• Read architect or engineer drawing of plumbing system. • Demonstrate different types of pipes. • Explain hot water generation in Solar Heater & Distribution in detail. • Enlist different types of pipe materials used with its applications.
7. Interpret water distribution system & demonstration of water meter. (NOS: PSC/N9450)	• Study a typical water distribution system and demonstrate its different components. • Demonstrate use of fire sprinkler and its different components with its applications. • Explain in detail hot water and cold-water distribution system. • Inspect typical solar water heater system and demonstrate its different components with its applications. • Fixing & maintenance of different water meter. • Identify the problem with water meter and provide solution • Demonstration of water heater.
8. Install and maintain pressure in boosting pumps. (NOS: PSC/N9451)	• Perform installation of pressure boosting pump • Identify the problems and perform basic maintenance of pressure boosting pump.
9. Reduce water wastage and increase water efficiency. (NOS: PSC/N9452)	• Read and study schematic diagram of waste drainage system. • Identify typical traps and vent and explain its functions.
10. Identify, select and perform cutting of Pipes. (NOS: PSC/N9453)	• Demonstrate different types of cutting tools in plumbing. • Use telescopic pipe cutter, Hexa pipe cutter to cut different PVC pipes. • Cut pipes of various diameter with different angles.
11. Carry out joining, fitting and laying of different types of PVC Pipes. (NOS: PSC/N9454)	• Prepare PVC pipes for fitting and joining process with help of tools. • Perform fitting operations for different PVC pipes with solvent. • Prepare Pipeline circuit & schedule use of tools and accessories.

12. Install, fix and maintain different taps, valves, etc. (NOS: PSC/N9455)	• Demonstrate different types of taps and valves and its applications. • Assemble and disassemble taps and valve components. • Identify taps and valves in plumbing system with materials used.
13. Perform installation of different types of faucets, water closet and its repair. (NOS: PSC/N9456)	• Demonstration, installation of different faucets and mixer. • Demonstration, installation, and repair of water closet
14. Carry out testing of water pressure in plumbing system. (NOS: PSC/N9457)	• Setting up hydraulic pressure machine • Demonstrate the water pressure test and make a study report.
15. Install, fix and maintain sanitary ware systems and their components. (NOS: PSC/N9458)	• Read technical drawing of sanitary ware. • Demonstration Installation of sanitary fitting. Perform cleaning of drainage pipeline with the help of cleaning rod
16. Install, fix and maintain kitchen sink, wash basin, bathtub, etc. (NOS: PSC/N9459)	• Select kitchen sink as per application. • Demonstrate of installation of wash basin • Demonstrate of installation of Kitchen sink • Demonstrate of installation of bathtub
17. Perform rainwater, gray water harvesting and conservation. (NOS: PSC/N9460)	• Demonstrate process of fixing PVC rainwater gutter outlet and connection to ground PVC pipe. • Identify all components in Rainwater harvesting system and materials used in it. • Erect rainwater harvesting and piping system. • Inspect the pipeline as per site layout provided by architect/engineer.
18. Carry out repairing and maintenance of plumbing system. (NOS: PSC/N9461)	• Perform different testing to identify the problem and provide the solution. • Assemble and disassemble the plumbing equipment's as per standard guidelines. • Change the tap and valve • Make an inspection report for plumbing system

19. Construct various brick bond for inspection chamber with multi-inlet gradients adopted for conveyance of Black Water and grey water without any obstruction various vent pipes for ventilation provided to arrest foul gas with various traps. (NOS: PSC/N9463)	• Prepare Cement Mortar and Plain cement Concrete. • Apply mason hand tools. • Lay Floor Trap, Multi Floor Trap. • Construct brick wall with (various bonds). • Replace concealed pipe. • Plastering, damp-proofing. • Construct gully chamber for unfoul pipes (wash basin, sinks, bathtub, shower etc.). • Construct Inspection Chamber for foul pipes (Closet, urinal, bidets, etc.). • Construct Soak Pit for unsewered areas. • Construct Septic tank with vent. • Construct inspection chamber with benching and channelling. • Connect to the street sewers Man Hole.
20. Prepare and maintain the records of plumbing system. (NOS: PSC/N9462)	• Prepare a project report with the help of case study. • Manage and maintain the calibration and warranty documents. • Keeping and maintain the technical documents, architect, or engineer's layout. • Prepare preventive maintenance schedule and check point list for customers.
21. Install, calibrate, respond and schedule a smart water meter, smart leak detector and automated irrigation system. Troubleshoot & Diagnose with Smart Tools. Install and setup low flow devices, smart water heaters for energy efficiency and remote control. (NOS: PSC/N9474)	• Perform the operation of smart water meter. • Install smart leak detectors in high-risk areas like under sinks, near water heaters, and in basements. • Install a smart irrigation controller and connect it to the water supply. • Use a smart flow meter to measure and analyze water flow rates in pipes. • Install a smart water heater and connect it to a mobile device.
22. Read and apply engineering drawing for different application in the field of work. (NOS: PSC/N9401)	• Read & interpret the information on drawings and apply in executing practical work. • Read &analyze the specification to ascertain the material requirement, tools and assembly/maintenance parameters. • Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.

23. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS: PSC/N9402)	• Solve different mathematical problems • Explain concept of basic science related to the field of study

7. TRADE SYLLABUS

SYLLABUS FOR PLUMBER TRADE			
DURATION: ONE YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
Professional Skill 25 Hrs; Professional Knowledge 05 Hrs	1. Identify and comply with the safe working practices, environmental regulation and housekeeping.	1. Importance of safety Practice, List of tools & tackles & Machinery used in the workshop. 2. List out the basic need for Personal Protective Equipment (PPE). 3. Practice on First Aid Methods. 4. Safe disposal of waste materials like cotton waste, metal chips/burrs etc. 5. Hazard identification and avoidance. 6. Safety signs for Danger. 7. Warning, caution &personal safety message. 8. Preventive measures for industrial environment, electrical accidents & steps to be taken for such accidents. 9. Identifying different types of Fire Extinguishers, and their use in case of Fire. 10. Practice and understand precautions to be followed while working.	• All necessary guidance to be provided to the newcomers to become familiar with the working of Industrial Training Institute system including stores procedures. • Soft Skills, their importance. Scope of Job after completion of training. • Importance of safety and general precautions observed in the industry/shop floor. • Introduction of First aid. Operation of electrical mains and electrical safety. • Introduction of PPEs. • Response to emergencies e.g., power failure, fire, and system failure. • Importance of housekeeping & good shop floor practices. • Introduction to 5S concept & its application. • Occupational Safety & Health: Health, Safety and Environment guidelines, legislations & regulations as applicable. • Basic understanding on work permit methodology, confined space work.

		11. Safe use of tools and equipment used in the trade.	
Professional Skill 35 Hrs; Professional Knowledge 10 Hrs	2. Identify different tools, equipments, and fittings for plumbing.	12. Demonstrate use of different types of Vices. 13. Demonstrate use of various assembling Hand tools: -Different files, hammer, Hacksaw, Chisel, etc. 14. Mark out lines, gripping suitably in vice jaws, hacksawing to given dimensions. 15. Filing- Flat and using deburring tool. 16. Demonstrate laser pen. 17. Perform laser cutting techniques. 18. Marking with the help of laser distance meter, filing, and deburring of PVC Pipe. 19. Marking according to simple blueprints for locating, positioning of holes, with marking tools. 20. Mark, Selection of drill bit and perform drilling operation with the help of drilling. 21. Study and use of pipe vice and internal and external threading dies. 22. Fixing different Pipe fittings in different position of Pipe.	• Introduction to different tools like Vice and chain wrench, various hand tools like files, hammer, hacksaw, chisel, vice jaws, steel rule, V block Pipe Vice, water pump pliers, Pipe cutter, threading dies, sink auger, internal pipe cutter etc. • Different Types of Pipe Fittings: - Socket, Elbow, Tee, Union, Bend, Cap, Plug, etc. • Concept of laser pen. • Concept of laser distance meter. • Use of drilling machine and importance of drill bit selection.

Professional Skill 25 Hrs; Professional Knowledge 05 Hrs	3. Identify basic electrical components and simple sensors in plumbing work and prepare electrical wire joints, carry out soldering, crimping.	23. Identify the different types of active electronic components. 24. Prepare terminations of cable ends 25. Practice on skinning, twisting and crimping. 26. Make simple twist, married, Tee and western union joints.	• Fundamentals of electricity, definitions, units & effects of electric current. • Conductors and insulators. • Conducting materials and their comparison. • Joints in electrical conductors. • Underground cables: Description, types.
Professional Skill 45 Hrs; Professional Knowledge 15 Hrs	4. Test and measure equipment's in plumbing.	27. Demonstrate Wall chaser machine. 28. Demonstrate Air blower. 29. Demonstrate straight grinder machine. 30. Use a pressure testing machine to test pressure at different plumbing locations. 31. Test & identify Pressure release valves. 32. Demonstrate and use of infrared thermometer and enlist its application. 33. List out the component required for water leakage testing assembly in pipe systems.	• Introduction to Wall chaser. • Concept of air blower. • Nomenclature and application of straight grinder. • Pressure testing machine and its use and application. • Introduction to infrared thermometer and its applications. • Introduction to advanced laser distance meter and its applications. • Introduction to methodology for water leak detection and its applications. • Water Leakage Testing Assembly installation process and its application • Concept of Combustible Gas Detector • Hydrocarbon gas detector
Professional Skill 25 Hrs. Professional Knowledge 05 Hrs.	5. Interpret plumbing system and plumbing terminology.	34. Enlist different tools used in plumbing with its applications. 35. Study types of Plumbing system with its different applications.	• Introduction to Plumbing. Plumbing Terminologies – Air gap, Backflow, Back-Siphonage, Backwater valve, Cesspool, cross connection, dry/wet area, Fixture unit,

		36. Identify & list out the different components in plumbing system 37. Study a schematic diagram of any plumbing system showing all individual components in it.	Float Valve, Flush Cock, Flush Tank, Interceptor, Inspection Chamber, Potable water, Push tap, Sensor operated faucet, septic tank, Single lever Mixer, Slope, static head, Strainer, Thermostatic Valve, different types of Traps, Vent pipe, Water Hammer, Water Pressure Knowledge of different types of flushing and Pneumatic flushing.
Professional Skill 25 Hrs; Professional Knowledge 05 Hrs.	6. Read the plumbing drawings.	38. Identify basic process flow diagram e.g., domestic, commercial etc. 39. Read, study and quantify from the detail drawing plumbing drawing for the plumbing system 40. Enlist the types of pipe materials used in plumbing with its application.	• Basic planning for plumbing – Location of daily water requirements, Water sources, quality of water & treatment, Water storage, Water Distribution, • Hot water generation & distribution • Types of pipes (SWR, UPVC, CPVC, GI, OPVC, SS, PPR, composite, PEX, copper, rubber, HDPE, MDPE etc.) and their selection criteria • Concept of composite PVC/uPVC pipe. • Installation of Pipes and fittings Vs old process of laying or jointing.
Professional Skill 45 Hrs; Professional Knowledge 15 Hrs.	7. Interpret water distribution system & demonstration of water meter.	41. Read and understand the drawings of water distribution system. 42. Install water meter, water storage system and incorporate its	• Estimation of Water requirements, Water sources, quality of water & treatment, Water storage, Water Distribution, • Water pressure vs water flow

		applications. 43. Install water sprinkler system for water fountain and irrigation system 44. Measure the temperature of water (hot and cold) inside pipeline. 45. Study the Layout of pipeline for hot and cold-water distribution as per drawing, prepare list of important components 46. Demonstrate to understand the Installation of pipeline for distribution of hot & cold water (GI/ CPVC/PPR/ COMPOSITE PIPE/PEX). 47. Install hot water system (like geyser, Solar water heater & heat pump).	• Dynamic pressure & static pressure. • Concept of Fire sprinkler system its components and its installation process. • Safety measures in water distribution system • Introduction to heat transfer. • Types of insulation for hot water. • Cold water distribution system. • Hot water distribution system. • Plumbing equipment and material required for hot and cold-water distribution. • Method of ventilating pipes • Introduction to Solar water heater system and its applications • Fixing of solar water system. • Components of water heater and it's working. • Concept of water meters. • Guideline of safety installation and fixing of water meter.
Professional Skill 55Hrs. Professional Knowledge 05 Hrs.	8. Install and maintain pressure in boosting pumps.	48. Demonstrate and install water supply and pressure boosting pump. 49. Demonstrate maintenance of water supply and pressure boosting pump. 50. Study of schematic drawing of water to overhead tank through pump by gravity and	• Water supply system of a small town. • Introduction to pressure boosting pump, its functions and applications

		direct pressure boosting (without OHT), pressure head, delivery pipe, suction pipe, etc.,	
Professional Skill 20 Hrs; Professional Knowledge 10 Hrs.	9. Reduce water wastage and increase water efficiency.	51. Study a schematic diagram and enlist different components used in Waste water drainage system. 52. Study, install types of Traps and Vents in waste water system.	• Soil & Waste drainage. • Concept of drinking and wastewater treatment plants, • Sizing of pipes, Calculation of water utilization, Installation of Taps, Vents, Inspection chambers & Manholes, gravity drains, sewage treatment systems.
Professional Skill 35 Hrs; Professional Knowledge 10 Hrs	10. Identify, select and perform cutting of Pipes.	53. Study the layout of drainage system, types of materials used 54. Cutting different diameters of PVC/uPVC/C.I. pipes as per layout. 55. Demonstrate portable jig saw machine. 56. Cutting of PVC pipe using different pipe cutters.	• Introduction to type of pipe bends & pipe bending concept for water flow. • Introduction to portable jig saw machine. • Internal pipe cutter, Telescopic pipe cutter, Hexa pipe cutter, Rachet type PVC Pipe cutter • Concept of handheld sander /Polisher. • Method of PVC pipes Cutting or Jointing, etc. • Types of cutting and joining tools for piping. Such as Pipe cutter, pipe bending machine, threading dies, chain wrench, etc. • Safety precautions to be observed. • Plumbing Symbols and Code for Tools & Materials on water line.
Professional Skill 55 Hrs.	11. Carry out joining, fitting	57. Preparation of different	• All type of pipes, pipe fittings

Professional Knowledge 05 Hrs.	and laying of different types of PVC Pipes.	PVC/uPVC pipe and Fittings before joining. 58. Use Stainer for removal or blockage inside the pipes. 59. Fixing of PVC/uPVC fittings by using solvent cement. 60. Study and demonstrate rubber ring joint of PVC pressure Pipe. 61. Make a Pipeline circuit on PVC/uPVC Pipe with Socket, Elbow, Bend, Tee, clean out, door fittings etc. as per drawing. 62. Pipe joints (GI, PE, PPR, Composite, copper etc.) 63. Installation and maintenance of pump (centrifugal, submersible, hand pump, booster pump etc.) 64. Fix water hammer arrester, water level indicator 65. Install water purifier 66. Pipe bending 67. service connection, fix Water meter.	and joints. • Impurities of Water, test of water, hard and soft water and it's removal. • Pumps (different types). • Service connection. • Introduction to different types of fitting and its applications, introduction to different solvent for joining process, Different types of Joints, Fittings and Materials in joining pipes: - PVC/CPVC, uPVC etc. • Methods of fixing and joining and their uses. Precautions to be taken while fixing.
Professional Skill 65 Hrs. Professional Knowledge 10 Hrs.	12. Install, fix and maintain different taps, valves, etc.	68. Demonstrate, identify and install various taps& valves, (Angle cock, stop cock, Bottle trap, Bib cock, two in one mixer, 2- and 3-way Divertor, three in one mixer, Shower head, Health faucet, Hand	• Introduction to taps & valves. • Types of taps and their application. • Application and installation guidelines for Piller cock, angle cock, flush cock, concealed cock, Push cock • Types of valves and their

		shower, thermostat, flush valves, 3 inlets tap, Sink taps.	application. • Basic knowledge of low flow fixtures, water aerator
Professional Skill 35 Hrs. Professional Knowledge 10 Hrs	13. Perform installation of different types of faucets, water closet and its repair.	69. Demonstrate, identify and install various types of water closet Floor mounted – P and S trap, Wall hung closet with Flushing cistern (open and concealed, Orissa pan and Asian pan. 70. Demonstrate, identify and install various types of urinals and Bidet 71. Demonstrate, identify and install various types of wash basin – Rectangular, Oval (counter top and counter sunk, corner wash basin, pedestal wash basin. 72. Demonstrate, identify and install Kitchen Sink 73. Demonstrate, identify and install Bath tub 74. Demonstrate and installation of sensor faucets. (Touch less)	• Types of faucets and its selection • Application and installation guideline fir Telephonic wall mixer with luxury slide rail and telephone shower • Concept of sensor based in faucets. • Water closet and its selection • Installation guide for faucets
Professional Skill 25 Hrs. Professional Knowledge 05 Hrs	14. Carry out testing of water pressure in plumbing system.	75. Setting up of Hydraulic manual Pressure Testing Machine. 76. Water pressure test by Hydraulic Pressure Testing Machine.	• 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 and its importance and risk in the system.
Professional	15. Install, fix and	77. Study drawing of sanitary	• Introduction to Retrofitting of

Skill 75 Hrs. Professional Knowledge 15 Hrs	maintain sanitary ware systems and their components.	ware. 78. List out the application of various sanitary ware fitting. 79. Demonstration and Installation of open PVC/ uPVC/CI Pipes cistern. 80. Demonstration and Installation of concealed cistern. 81. Fixing, Installing and demonstration 23-inch Orissa pan (Indian Pan) 82. Demonstration and Installation of sanitary ware fittings. 83. Installing and demonstration wall mounting urinal 84. Perform cleaning of drainage pipeline with the help of cleaning rod.	plumbing systems. • Sanitary fixtures and appliances • Reading of sanitary plumbing drawing. • General guidelines for Installing of sanitary fittings. • Cistern – Open and concealed (fixing of flush tank) • 23-inch Orissa pan (Indian Pan) • Types of urinals and its installation process • sanitary symbols and its plumbing codes for all tools and materials • Advanced plumbing trends and different materials used in piping systems. (e.g., Noise reducing drainage water system – silencecio) • Foam core drainage pipelines. • Scrapping and painting of pipelines. • Study and identify the advanced plumbing trends and different materials used in piping systems. (Noise reducing drainage water system – silencecio)
Professional Skill 75 Hrs. Professional Knowledge 15 Hrs	16. Install, fix and maintain kitchen sink, wash basin, bathtub, etc.	85. Demonstrate, installation of wash basin (Wall hang and over the counter). 86. Demonstrate installation of Kitchen sink. 87. Demonstrate installation of bathtub	• Concept and accessible of Washroom accessories and its selection. • Design criteria for washroom accessories, water closet, • Fitting consideration of Wash basins

		88. Demonstrate drainage chock up removal with the help of sink auger (Drain gun) inside kitchen sink. 89. Demonstration and installation Bottle trap Regular & PVC/ uPVC P type Traps 90. Installing and demonstration floor mounting EWC (European water closet) 91. Installing and demonstration wall mounting EWC (European water closet) 92. Fixing of – Towel rod, towel ring, towel bracket, soap dish, toilet paper holder.	• Fitting consideration for kitchen sink Showers, Bathtubs, Grab bars, • Different types of washbasins and sinks. • Bottle trap (Ptype) • Basic troubleshooting and maintenance guideline for kitchen sink, bathtub, etc. (e.g., Drainage chock up) • Types of floors mounting EWC (European water closet) • Types of walls mounting EWC (European water closet) • Bathroom fittings Towel rod, towel ring, towel bracket, soap dish, toilet paper holder.
Professional Skill 35 Hrs. Professional Knowledge 10 Hrs.	17. Perform rainwater, gray water harvesting and conservation.	93. Install PVC/uPVC/CI Pipes rainwater gutter outlet and connection to ground PVC/uPVC/CI pipe. 94. Install rainwater harvesting and piping system as per the layout. 95. Prepare an Inspection report of chamber, soak pit.	• Introduction to water conservation. • Water conservation measures • Concept of rainfall intensity. • Drainage system and its types. • Layout reading of drainage system. • Siphonic rainwater system. • Collection and storage. • Recharge and disposal system. • Method of testing drainage lines • Testing method of drainage pipeline system. • Inspection chamber, septic tank, cesspools, soak pits etc.

			• Types of traps and its application. • Concept of Rain water harvesting. • Gray water harvesting system – eco pipes. Study and enlist different components rainwater harvesting system supplied in lab as a demonstration model. • Study layout of rainwater harvesting system and bore well recharge system.
Professional Skill 80 Hrs. Professional Knowledge 10 Hrs.	18. Carry out repairing and maintenance of plumbing system.	96. Assemble and dissemble of different taps. 97. Assemble and dissemble of cistern. 98. Perform different testing to identify the water leakage problem and provide the solution for leakages. 99. Maintenance and repairing of pipeline. 100. Check working of Sensor system for wash basin 101. Regular maintenance of push cock system for urinals. 102. Find fault and their rectification 103. Repair & replace the tap and valve.	• Periodic inspection, testing and maintenance. • Cleaning of storage tank Testing of water quality Inspect leakages of pump, valve and its rectifying techniques. • Inspect the water pressure system. • Inspect water level indicator and sensors, • Inspect pipe supporting clamps and supporting system. • Clamping positions Check operation and effectiveness of non-return valve, • Inspect thermoset. • Cleaning Sanitary fixtures. Inspect trap, chamber Inspect drainage pipes and outlets. • Sensor system for urinals and

			wash basin, etc. • Corrosion - causes and remedies, prevention. • Effect of water and frost on materials.
Professional Skill 25 Hrs. Professional Knowledge 05 Hrs.	19. Construct various brick bond for inspection chamber with multi-inlet gradients adopted for conveyance of Black Water and grey water without any obstruction various vent pipes for ventilation provided to arrest foul gas with various traps.	104. Preparation Cement Mortar and Plain cement Concrete. 105. Application of mason hand tools 106. Laying Floor Trap, Multi Floor Trap. 107. Construct brick wall with various bonds. 108. Identify leakage or seepage and repair/ replacing of concealed pipe. 109. Use of smart leakage detector. 110. Plastering, damp-proofing 111. Construct gully chamber for unfoul pipes (wash basin, sinks, bathtub, shower etc.) 112. Construct Inspection Chamber for foul pipes (Closet, urinal, bidets, etc.) 113. Construct Soak Pit for unsewered areas 114. Construct Septic tank with vent 115. Construct inspection chamber with benching and channelling 116. Connect to the street	• Construction Materials - Identify, Description, Application, Grade. • Brick Bonds and its types selection according to the place. • Traps/ foul and unfoul inspection Chambers. • Importance of ventilation • Use of manhole • Soak pit, cess pool, Septic tank • Concept of mivon technology. • Basics of water proofing and tiling. • Basic of add mixture during concreating.

		sewers Manhole 117. Install PVC manhole chamber.	
Professional Skill 25 Hrs. Professional Knowledge 05 Hrs.	20. Prepare and maintain the records of plumbing system.	118. Make installation report as per case study. 119. Make a routine and preventive maintenance schedule as per standard guidelines. 120. Make a SOP for repair and maintenance of plumbing for domestic and commercial users.	• Importance of preparing and maintain the record of installation and repair maintenance of plumbing. • Industrial case study for commercial complex. • Case study for residential buildings. • Creation and maintain documents like: Project report Installation report, • Job works estimation and actual work cost. • Test and calibration certificate, • Warranty certificate Valve identification chart, • Routine and preventive maintenance schedule List of manufacturer and supplier Standard operating procedure (SOP) for repair and maintenance as per Indian standard code of practice for water supply.
Professional Skill 10 Hrs; Professional Knowledge 05 Hrs	21. Install, calibrate, respond and schedule a smart water meter, smart leak detector and automated irrigation system.	121. Install a smart water meter. 122. Set up and test the meter using a smartphone app to track water usage. 123. Install smart leak detectors in high-risk areas like under sinks,	• Introduce of smart water meters and how they work. • Types of smart water meters, its benefits. • Explain how a smart leak detection system works. • Explain how to implement a smart irrigation system.

	Troubleshoot & Diagnose with Smart Tools. Install and setup low flow devices, smart water heaters for energy efficiency and remote control.	near water heaters, and in basements. 124. Test sensors by simulating a leak (using water). 125. Install a smart irrigation controller and connect it to the water supply. 126. Test its connectivity with a smartphone and set automated watering schedules. 127. Use a digital pressure gauge to test water pressure in different parts of the plumbing system. 128. Use a smart flow meter to measure and analyze water flow rates in pipes. 129. Install plumbing diagnostics apps on smartphones or tablets. 130. Troubleshoot a simulated plumbing problem using the app (e.g., water pressure, flow rates, temperature, etc.). 131. Install low-flow faucets and aerator showerheads. 132. Test water flow before and after installation using a flow meter. 133. Install a smart water heater and connect it to a mobile device. 134. Set temperatures and schedules via the app.	• Explain how to diagnose plumbing issues using smart diagnostic tools and how to use mobile apps for real-time diagnostics and troubleshooting. • Explain how to reduce water consumption using eco-friendly fixtures. • Introduce and explain how a smart water heater can be controlled remotely. • Explain how to conduct routine maintenance using smart devices. • Explain how to diagnose problems remotely using smart technology. • Concepts to design a small-scale plumbing system.
ENGINEERING DRAWING			

Professional Knowledge ED- 30 Hrs.	22. Read and apply engineering drawing for different application in the field of work.	Introduction to Engineering Drawing and Drawing Instruments– • Conventions • Sizes and layout of drawing sheets • Title Block, its position and content • Drawing Instrument Free hand drawing of– • 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: • Angle, Triangle, Circle, Rectangle, Square, Parallelogram. • Reading of dimension and Dimensioning Practice. Symbolic representation– • Different symbols and Pipe joints used in the trade. Reading of layout plan drawing in piping
WORKSHOP CALCULATION & SCIENCE		
Professional Knowledge WCS- 30 Hrs.	23. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study.	**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 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 **Material Science** Types metals, types of ferrous and non-ferrous metals Physical and mechanical properties of metals Properties and uses of insulating materials **Mass, Weight, Volume and Density** Mass, volume, density, weight and specific gravity. Related problems for mass, volume, density, weight and specific gravity **Heat & Temperature and Pressure** Concept of heat and temperature, effects of heat, difference

		between heat and temperature, boiling point & melting point of different metals and non-metals Scales of temperature, Celsius, Fahrenheit, kelvin and conversion between scales of temperature **Basic Electricity** Introduction and uses of electricity, molecule, atom, how electricity is produced, electric current AC, DC their comparison, voltage, resistance and their units **Mensuration** 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 **Trigonometry** Measurement of angles Trigonometrical ratios

SYLLABUS FOR CORE SKILLS
1. Employability Skills (Common for all CTS trades) (120 Hrs.)

Learning outcomes, assessment criteria, syllabus and Tool List of Employability Skills is provided separately in www.cstaricalcutta.gov.in / www.bharatskills.gov.in / www.dgt.gov.in

ANNEXURE-I

PLUMBER			
LIST OF TOOLS AND EQUIPMENT (For Batch of 24 Candidates)			
Sl. No.	**Name of the Tool &Equipment**	**Specification**	**Quantity**
A. TRAINEES TOOL KIT			
1.	Hand Gloves		24 Set
2.	Safety Shoes		24 pair
3.	Helmet		24 Nos.
4.	Plumber tool kit	Measuring Tape, allen key set, star allen key set, DE Spanner set, tubular spanner 20-23, adjustable spanner-12'', Pipe Vice, pipe wrench (10'',12'',14'') one each, water pump pliers, Pipe cutter, ratchet threading die set, chain, TDS meter, sink auger, advanced laser distance meter, vice grip plier, screw driver with straight edge and star end(reversible), spirit level-12'' metal body, flat chisel octagonal -12'', ball pein hammer-100 or above gm	Each 1 No. for each trainee
B. TOOLS, INSTRUMENTS AND GENERAL SHOP OUTFIT			
5.	"V" block	V-Block pair 7 cm with clamps	1 No.
6.	"V" block	V-Block 15 cm with clamps	1 No.
7.	Bench Vice	150 mm	8 Nos.
8.	Pipe Vice	No. 4	4 Nos.
9.	Rachet type pipe die set	BSP Thread ½" to 2"	4 Set
10.	Dies and Die Stock (Cup Model)	BSP Thread ½" to 1"	4 Set
11.	Dies and Die Stock (Cup Model)	BSP Thread 1 1/4" to 2"	4 Set
12.	Taps and Tap Wrench	BSP Thread ½", ¾", 1"	4 Set
13.	Pipe Bending Machine Manual	Bench Type	1 Unit
14.	Pipe Bending Machine Hydraulic	6 Ton Capacity 3/8,1/2,3/4 and 1 Inches, Pipe thickness 1.5 to 3.5 mm	1 Unit
15.	Hand Pump	No. 2	1 Unit
16.	Centre punch		04 nos.
17.	Hydraulic Pressure Testing	5 – 10 Kgs/Sq. cm	01 No.

	Machine Manually operated type		
18.	Metal L	Metal - L - 15cm	01 No.
19.	Metal L	Metal - L - 30cm	01 No.
20.	Angle Plate	10 x 20 cm.	01 No.
21.	Spirit Level	30 cm metal	10 Nos.
22.	File triangular	15 cm smooth	10 Nos.
23.	File square	25 cm second cut	10 Nos.
24.	File triangular	20 cm second cut.	10 Nos.
25.	File flat	30 cm second cut.	10 Nos.
26.	File flat	30 cm bastard.	10 Nos.
27.	File Swiss type	Needle set of 12.	10 Nos.
28.	File half round	25 cm second cut.	10 Nos.
29.	File round	30 cm bastard.	10 Nos.
30.	File hand	15 cm second cut.	10 Nos.
31.	file card.		10 Nos.
32.	Oil Stone	15 cm x 5 cm x 2.5 cm	10 Nos.
33.	combination Pliers'	15 cm	10 Nos.
34.	Blow Lamp	0.50 liters.	4 Nos.
35.	Hot air blower	2000 watts	02 Nos.
36.	Spanner	D.E. 6 -26 mm set of 10 pcs.	02 set
37.	Spanner adjustable	12''	02 Nos.
38.	Box spanner	Set 6-25 mm set of 8 with Tommy bar.	02 Nos.
39.	Clamp "C"	10 cm	04 Nos.
40.	Scraper flat	15 cm.	02Nos.
41.	Scraper triangular	15 cm	02 Nos.
42.	Scraper half round	15cm	02 Nos.
43.	Chisel	pointed cold 3/4 ''x9''	10 Nos.
44.	Chisel	flat cold 3/4 ''x9''	10 Nos.
45.	Chisel – cold flat	¾'' x 18''	05 Nos.
46.	Chisel - cold pointed	¾'' x 18''	05 Nos.
47.	Chisel - cold round nose	9mm x 200mm	02 Nos.
48.	Chisel-lead caulking	¾'' x 12''	02 Nos.
49.	Iron pot with ladle for melting lead		01 no.
50.	Hand hammer	800 gm. with handle Ball Peen	10 Nos.
51.	Rubber hammer	Standard size (as required)	5 Nos.

52.	Hacksaw	frame fixed 30 cm.	12 Nos.
53.	Hacksaw	frame adjustable 30 cm.	12 Nos.
54.	Mallets Wooden	Standard size (as required)	5 Nos.
55.	Hammering Hand Drilling Machine	Rated input power: 720W, Mason Drill bit size 6 mm to 20 mm	1 Set
56.	Hammering Hand Drilling Machine (heavy duty)	Rated input power: 1000W & above, Mason Drill bit size 6 mm to 32 mm	1 Set
57.	Metal Saw	No-Load Speed: 3,800 rpm, saw blade diameter 355 mm, saw blade bore 25.4 mm	
58.	Bench Grinder	Power consumption 400 - 600 Watts, RPM without load 2600, Disc Dia. 6”	
59.	Professional Air Blower	Power consumption: 820 W, No-load speed: 16000rpm, Flow rate: 0-4.5 m3/s	
60.	Hammer Wired	Drill type: hammer, optimum power transfer	
61.	Laser Light Pen		
62.	Laser cutting machine		
63.	Surface Plate	Cast iron	
64.	Digital Screw Pitch Gauge	Working voltage: 3.0 V / DC, Measure precision: 0.1 degree	
65.	Laser Distance Measurement Instrument	Levelling Accuracy (Vial): +/- 0.2degree, Measuring Accuracy Typical: +/- 1/16 inch (1.5 mm)	
66.	Allen Screwdriver Wrench Tool	6Pcs T Handle Ball Ended Hex Key	
67.	Universal Quick Adjustable Multi-Function Wrench Spanner	Range: 6-32mm	
68.	Double Ended Wrench Hex Socket Spanner	8 In 1, Range: 6-32mm	
69.	HDPE Butt Fusion Welding Machine	Manual Four Clamp 50 to 200mm	1 No.
70.	Hydraulic Pipe bending machine	Max Pressure - 23T Max Stock - 370mm	1 No.
71.	PPR pipe cutter for PPR pipe cutting	from 20mm to 40mm	1 No.
72.	Trowel		As required
73.	Mortar Pan		As required
74.	Straight Edge		As required

75.	Steel / Wooden float		As required
76.	Spade		As required
77.	Shovel		As required
78.	Plumb Bob		As required
79.	Cold Chisel		As required
80.	Brick hammer		As required
81.	Water jug		As required
82.	Water Bucket.		As required
83.	Water Level Tube		As required
84.	Non-contact voltage tester (NCV)		01 no.
85.	Pick axe		As required
86.	Wheel Barrow		As required
87.	Mason Square		As required
88.	Crow bar		As required
89.	Rammer		As required
90.	Pressure testing machine		As required
91.	infra-red thermo meter		As required
92.	Gas detector		As required
93.	Fire sprinkler		As required
94.	Solar water heater		As required
95.	water meter		As required
96.	Electric water heater		As required
97.	Pipe bending machines		As required
98.	Internal pipe cutter		As required
99.	Hand held polisher		As required
100.	Telescopic pipe cutter		As required
101.	Ratchet pipe cutter		As required
102.	Hexa pipe cutter		As required
103.	PVC welding machine,		As required
104.	PPR fusion welding machine		As required
105.	Booster pump		As required
106.	Centrifugal pump		As required
107.	Hand pump		As required
108.	Submersible pump		As required
109.	Pipe Bending spring		As required
110.	Chain cutter		As required

111.	Chain wrench		As required
112.	Chain vice		As required
113.	Sensor tap, sensor urinal		As required
114.	Auger		As required
115.	Closets, Basin, bath tub, sink etc.		As required
116.	Diverter		As required
117.	Thermostat		01 no.
118.	Flush cock		As required
119.	Full body harness		06 nos.
120.	Smart leakage detector		01 no.
121.	Smart Water Meter	Wi-Fi/Bluetooth enabled; app compatible	1 No.
122.	Smart Leak Detectors	Wireless, battery operated, audible alert, Wi-Fi connectivity	1 No.
123.	Smart Irrigation Controller	8–12 zone capacity, weather-sensing, Wi-Fi enabled	1 No.
124.	Smartphone or Tablet	Android/iOS compatible, min. 4GB RAM, 32GB storage, Wi-Fi enabled	1 No.
125.	Wi-Fi Router/Access Point	Dual band (2.4GHz & 5GHz), minimum 300 Mbps speed	1 No.
126.	Plumbing Demo Board	Wall-mountable, equipped with sample water lines, fixtures, and shutoff valves	1 No.
127.	Assorted Pipe Fittings & Valves	PVC, PEX, copper types in 1/2", 3/4", 1" sizes for simulation setups	1 Set
128.	Digital Pressure Gauge	0–200 PSI range, LCD display, 1/4" NPT fitting, ±1% accuracy (e.g., Winters or REED Instruments)	1 No.
129.	Smart Flow Meter	0.5–30 GPM range, app-compatible, wireless connectivity, clamp-on or inline	1 No.
130.	Multimeter	Auto-ranging, AC/DC voltage, resistance, continuity, CAT III 600V certified	1 No.
131.	Plumbing Diagnostic Mobile Apps	manufacturer-specific troubleshooting apps	1 No.
132.	Low-Flow Faucet Aerators	≤1.5 GPM (gallons per minute), male/female thread options	1 No.
133.	Low-Flow Showerheads	≤2.0 GPM flow rate, Water Sense labelled	1 No.
C. LIST OF CONSUMABLES			
134.	Rain Harvesting Fittings and bends- Set		1 No.

135.	Solar Water Heating Demo Kit/ Set (Red Move to Equipment)		1 No.
136.	Electrical Water Heater		1 No.
137.	Water Leakage Testing Assembly	CPVC Pipe with combined bundle of items	1 No.
138.	Frame Set for Bathtub		1 No.
139.	Drainage set for bathtub	Outlet	01 no.
140.	Core cutting tool / machine		01 no.
141.	Wall Chaser machine		1 No.
142.	Telescopic pipe cutter		1 No.
143.	Water Pump (Centrifugal and Accessories (Pressure boosting pump system)		1 No.
144.	Bath Tub-5 including waste coupling and over flow set	1/2 X 2 1/2	1 No.
145.	Water meter – Domestic type	½ inches	1 No.
146.	MS Frames U Clip Shape - Rainwater Harvesting		2 Nos.
147.	OH Shower		1 No.
148.	CP shower	Arm-9 " or 12"	1 No.
149.	Single Lever Diverter	2-way, 3-way diverter	1 No.
150.	Upper Cover Set-Deon		1 No.
151.	CP Spout		1 No.
152.	CP Angle Cock		5 Nos.
153.	Cons cock body		2 Nos.
154.	Cons Cock Cover		2 Nos.
155.	CP 2 in 1 bib cock		1 No.
156.	CP Angle Cock-2 in 1		1 No.
157.	CP Half Turn Flush Cock	1"	1 No.
158.	CP Bib Cock -	1/2"	1 No.
159.	CP Wall mounting Sink cock		2 Nos.
160.	CP bottle trap		3 Nos.
161.	waste pipe		
162.	CP pillar cock		1 No.
163.	Sensor Tap (Electrical/ Battery)		1 No.
164.	CP Wall Mixer tele shower		1 No.
165.	CP Tele Shower		1 No.
166.	Luxury Slide Rail		1 No.
167.	SS towel rod		1 No.
168.	SS towel ring		1 No.
169.	SS soap dish		1 No.
170.	Sensor based soap dish		01 no.

171.	SS Tumbler Holder		1 No.
172.	SS robe hook		1 No.
173.	SS Toilet Paper Holder		1 No.
174.	SS Towel Bracket		1 No.
175.	CP Bib cock	½''	1 No.
176.	Con Flush Tank + Frame + Cover plate Full-Set		1 No.
177.	Wall Hung EWC		1 No.
178.	Wall Hung Sensor based EWC		1 No.
179.	Squatting urinal		1 no.
180.	Shaving mirror		1 no.
181.	EWC S Trap + PVC Flush tank		1 No.
182.	Orissa Pan S Trap & P Trap	23"	1 No.
183.	Wash Basin – Wall Hung	16x22	1 No.
184.	Pedestal		1 No.
185.	Above Counter Wash Basin		1 No.
186.	Flat Back Large urinal		1 No.
187.	Steel Sink and accessories	16 X 19" Size	1 No.
188.	Steel Connection Flex Pipe	1/2x18"	1 No.
189.	PVC Connection	1/2x18", 24 ''	3 Nos.
190.	Health faucet,		1 No.
191.	RO / filter provision cock		1 No.
192.	basin fisher bolt set		1 No.
193.	PVC waste Pipe	1 ¼ "	1 No.
194.	Long Br. Waste coupling	1 ¼ '' x 5"	1 No.
195.	CP Ext long Nipple	1/2x 2 ½	1 No.
196.	CP Push Cock for Urinal	1/2"	1 No.
197.	Dome Waste Coupling		1 No.
198.	CP spreader		1 No.
199.	Br Screw	3"	1 No.
200.	L Bracket		1 No.
201.	NRV	1/2", ¾'', 1''	1 No.
202.	Strainer / Line Filter	1/2"	1 No.
203.	Drain or chock up Rod-Set (Tool)		1 No.
204.	CPVC MABT	3/4 X 1/2	5 Nos.
205.	CPVC Br Elbow	3/4 X 1/2	5 Nos.
206.	CPVC Br tee	1/2 X 1/2	3 Nos.
207.	CPVC Elbow	1/2" (90)	5 Nos.
208.	CPVC Pipe	3/4" -SDR 11 (3mtr)	2 Nos.

209.	CPVC Elbow	3/4 (90)	5 Nos.
210.	CPVC Tee	3/4	5 Nos.
211.	CPVC Coupling	3/4	5 Nos.
212.	CPVC over bend	3/4 step	1 No.
213.	CPVC Pipe	¾'', 1'' (5 mtr)	10 Nos.
214.	CPVC clamp	¾'', 1''	10 Nos.
215.	GI clamp	½'',3/4'', 1''	24 Nos. each
216.	GI Pipe	½'', ¾'', 1'', 1 ¼''	Each 4 length
217.	G.I Coupling Rigid	½'', ¾'', 1'', 1 ¼''	12 Nos.
218.	G.I Coupling Flexible	½'', ¾'', 1'', 1 ¼''	12 Nos.
219.	G.I Elbow	½'', ¾'', 1'', 1 ¼''	12 Nos.
220.	G.I Tee	½'', ¾'', 1'', 1 ¼''	12 Nos.
221.	G.I Union	½'', ¾'', 1'', 1 ¼''	12 Nos.
222.	G.I Plug	½'', ¾'', 1'', 1 ¼''	12 Nos.
223.	G.I Cap	½'', ¾'', 1'', 1 ¼''	12 Nos.
224.	G.I Bend	½'', ¾'', 1'', 1 ¼''	12 Nos.
225.	G.I Four-way (cross)	½'', ¾'', 1'', 1 ¼''	12 Nos.
226.	G.I Three-way (Elbow)	½'', ¾'', 1'', 1 ¼''	12 Nos.
227.	G.I Flange Oval	½'', ¾'', 1'', 1 ¼''	12 Nos.
228.	G.I Flange Round	½'', ¾'', 1'', 1 ¼''	12 Nos.
229.	G.I Reducer coupling	½''x ¾'', 1/2''x 1'', 3/4''x1'', 1''x 1 ¼''	12 Nos.
230.	G.I Reducer Elbow	½''x ¾'', 1/2''x 1'', 3/4''x1'', 1''x 1 ¼''	12 Nos.
231.	G.I Reducer Tee	½''x ¾'', 1/2''x 1'', 3/4''x1'', 1''x 1 ¼''	12 Nos.
232.	G.I Bush	½''x ¾'', 1/2''x 1'', 3/4''x1'', 1''x 1 ¼''	12 Nos.
233.	G.I Barrel nipple	½'', ¾'', 1'', 1 ¼''	12 Nos.
234.	G.I Reducer Barrel nipple	½''x ¾'', 1/2''x 1'', 3/4''x1''1''x 1 ¼''	12 Nos.
235.	Fisher bolt nut for (Wash Basin)		12 Nos.
236.	PVC Pipe	½'', ¾'', 1'', 1 ¼''	Each 24 metres
237.	PVC Coupler	½'', ¾'', 1'', 1 ¼''	12 Nos.
238.	PVC Long Coupler	½'', ¾'', 1'', 1 ¼''	12 Nos.
239.	PVC Elbow	½'', ¾'', 1'', 1 ¼''	12 Nos.
240.	PVC Tee	½'', ¾'', 1'', 1 ¼''	12 Nos.
241.	PVC Union	½'', ¾'', 1'', 1 ¼''	12 Nos.
242.	PVC Plug	½'', ¾'', 1'', 1 ¼''	12 Nos.
243.	PVC End cap	½'', ¾'', 1'', 1 ¼''	12 Nos.
244.	PVC Reducer coupler	½''x ¾'', 1/2''x 1'', 3/4''x1'',1''x 1 ¼''	12 Nos.
245.	PVC Reducer Elbow	½''x ¾'', 1/2''x 1'', 3/4''x1'',1''x 1 ¼''	12 Nos.
246.	PVC Reducer Tee	½''x ¾'', 1/2''x 1'', 3/4''x1''1''x 1 ¼''	12 Nos.
247.	PVC Bush	½''x ¾'', 1/2''x 1'', 3/4''x1'', 1''x 1 ¼''	12 Nos.
248.	PVC FTA	½'', ¾'', 1'', 1 ¼''	12 Nos.
249.	PVC MTA	½'', ¾'', 1'', 1 ¼''	12 Nos.

250.	PVC Connection hose	½'' x 12''	6 Nos.
251.	PVC Connection hose	½'' x 18''	6 Nos.
252.	PVC Connection hose	½'' x 24''	6 Nos.
253.	SS Connection hose	½'' x 12''	6 Nos.
254.	SS Connection hose	½'' x 18''	6 Nos.
255.	SS Connection hose	½'' x 24''	6 Nos.
256.	Standard pipe brackets set with clamps		12 Nos.
257.	CPVC cement Solvent	118ml	As required
258.	Artificial Grass Sheet		As required
259.	Steel Cupboards	66" x 37" x 18" - Steel and powder coated with Lock assembly- powder coated (furniture)	2 Nos.
260.	Table Top Support System-Steel-folding	30" HT - Steel and powder coted	2 Nos.
261.	Table Top Finished steel / powder coted	8ft X 2 ft - Steel and powder coted	1 No.
262.	Pipes	SWR ring fit & solvent based, UPVC, CPVC, GI, OPVC, SS, PPR, composite, PEX, copper, rubber, HDPE, MDPE etc.	As required
263.	Traps		As required
264.	Taps and valves		As required
265.	Rain water gutter		As required
266.	Inspection chamber		As required
267.	Towel rod, paper holder, soap dish etc.		As required

ANNEXURE - II

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts, trainers of ITIs, NSTIs, faculties from universities and all others who contributed in revising the curriculum.

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ANNEXURE-III

ABBREVIATIONS	
CTS	Craftsmen Training Scheme
ATS	Apprenticeship Training Scheme
CITS	Crafts Instructor Training Scheme
DGT	Directorate General of Training
MSDE	Ministry of Skill Development and Entrepreneurship
NTC	National Trade Certificate
NAC	National Apprenticeship Certificate
NCIC	National Craft Instructor Certificate
LD	Locomotor Disability
CP	Cerebral Palsy
MD	Multiple Disabilities
LV	Low Vision
HH	Hard of Hearing
ID	Intellectual Disabilities
LC	Leprosy Cured
SLD	Specific Learning Disabilities
DW	Dwarfism
MI	Mental Illness
AA	Acid Attack
PwD	Person with disabilities


कौशलं बलम्