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

COMPETENCY BASED CURRICULUM

PLUMBER

(Duration: One Year)
Revised in July 2022

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 3

SECTOR – PLUMBING

Directorate General of Training

PLUMBER

(Engineering Trade)

(Revised in July 2022)

Version: 2.0

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 3

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 role. 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 practical part starts with basic fitting in the beginning and the candidate imparted training on allied trades viz., carpenter, Welding (Gas & Arc), Masonry which leads to multi-skilling. In the basic fitting the skills imparted are marking, sawing, chipping, filing, measurement, soldering, brazing, drilling, grinding and observation of all safety aspects is mandatory. The accuracy achieved is of±0.25 mm. The safety aspects cover components like OSH&E, PPE, Fire extinguisher, First Aid etc. Cutting Pipes in different angle. Joining of pipes of different diameter and angles by gas welding, thread cutting on different types of pipes & fittings accessories. Making of brick wall and RCC casting. Brick wall cutting for concealing pipe line. Bending of Pipes, making of pipe line circuit for water distribution, fixing Cocks & valve, Water analysis test, Water Pressure test are being taught. Alignment and laying of humid pipeline & maintenance of drainage pipe line. Installation and maintenance of Electric pumps, Construction of inspection chamber, manhole, gutter, septic tank, socket etc. Testing of drainage pipe, Removal of leakage pipe line, Installation, fixing & maintenance of valve & cock, water meter, Fixtures, hot & cold water pipe line, Repairing & reconditioning of waste pipe line, Repairing & reconditioning, scraping & painting of sanitary fittings are being taught in the practical.

Professional Knowledge subject is simultaneously taught in the same fashion to apply cognitive knowledge while executing task. In addition, components like Physical properties of engineering materials, different types of iron, properties and uses, Heat & Temperature are also covered under theory part.

Total three projects need to be completed by the candidates in a group. In addition to above components the core skills components viz., employability skills are also covered. These core skills are essential skills which are necessary to perform the job in any given situation.

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 Technician and will progress further as Senior Technician, 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**

Every year 150 hours of mandatory OJT (On the Job Training) at nearby industry, wherever not available then group project is mandatory.

4	On the Job Training (OJT)/ Group Project	150

Trainees of one-year or two-year trade can also opt for optional courses of up to 240 hours in each year for 10th/ 12th class certificate along with ITI certification, or, add on short term courses.

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his 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.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 Controller of examinations, 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 percent for Trade Practical and Formative assessment is 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 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:

Performance Level	Evidence
(a) Marks in the range of 60%-75% to be allotted during assessment	
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.
(b) Marks in the range of 75%-90% to be allotted during assessment	
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.
(c) Marks in the range of more than 90% to be allotted during assessment	
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

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 lay out 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 fibre 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) NOS: PSC/NO133v1.0
ii) NOS: PSC/NO132
iii) NOS: PSC/NO134
iv) NOS: PSC/NO135
v) NOS: PSC/N9901 v 1.0
vi) NOS: PSC/NO136
vii) CSC/N9401
viii) CSC/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	NOS: PSC/NO133v1.0, NOS: PSC/NO132, NOS: PSC/NO134, NOS: PSC/NO135, NOS: PSC/N9901 v 1.0, NOS: PSC/NO136 CSC/N9401 CSC/N9402
NSQF Level	Level-3
Duration of Craftsmen Training	One Year (1200 hours +150 hours OJT/ Group Project)
Entry Qualification	Passed 8thclass 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	80 sq. m
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 experience in the relevant field. **OR** 03 years Diploma in Civil / Mechanical engineering from AICTE/ recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. **OR** NTC / NAC passed in Plumber or relevant trade with 3 years' experience. **<u>Essential Qualification:</u>** Relevant Regular / RPL variants of National Craft Instructor Certificate (NCIC) 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. However both of them must possess NCIC in any of its variants.
ii) Workshop Calculation & Science	B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field. **OR** 03 years Diploma in Engineering from AICTE / recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. **OR** NTC/ NAC in any one of the engineering trades with three years' experience. **Essential Qualification:** Regular / RPL variants of National Craft Instructor Certificate (NCIC) in relevant trade **OR** Regular / RPL variants NCIC in RoDA or any of its variants under DGT
iii) Engineering Drawing	B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field. **OR** 03 years Diploma in Engineering from AICTE / recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. **OR** NTC/ NAC in any one of the Mechanical group (Gr-I) trades categorized under Engg. Drawing'/ D'man Mechanical / D'man Civil' with three years' experience. **Essential Qualification:** Regular / RPL variants of National Craft Instructor Certificate (NCIC) in relevant trade **OR** Regular / RPL variants of NCIC in RoDA / D'man (Mech /civil) or any of its variants under DGT.
iv) Employability Skill	MBA/ BBA/ Any Graduate/ Diploma in any discipline with Two years' experience with short term ToT Course in Employability Skills.

	(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.
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 (TRADE SPECIFIC)

1. 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. [Basic fitting operation – marking, Hacksawing, Chiselling, Filing, Drilling, Taping and Grinding etc. Accuracy: ± 0.25mm]
   (NOS:PSC/NO133v1.0), (NOS:PSC/NO132), (NOS:PSC/NO134), (NOS:PSC/NO135), (NOS:PSC/N9901 v 1.0)
2. Perform Inner & Outer Thread cutting on Metal & Studs and thread cutting on different types of pipes & fittings accessories. (NOS:PSC/NO133)
3. Carry out cutting of Pipes of different Dia in different angle and Joining of pipes by gas welding, Soldering and Brazing. (NOS:PSC/NO133)
4. Construct Masonry brick wall and RCC casting. Brick wall cutting for concealing pipe line. (NOS:PSC/NO133),(NOS:PSC/NO134),(NOS:PSC/NO134)
5. Carry out Cutting and Bending of Pipes using Plumber's tools and equipment. (NOS:PSC/NO133)
6. Join various type of PVC pipe by heat process or Welding. (NOS:PSC/NO133)
7. Construct complete pipe line circuit with different types of Joints and fixing Cocks & valve on Pipe line. (NOS:PSC/NO133)
8. Carry out cutting of different Types of PVC Pipe, joining and laying. (NOS:PSC/NO133)
9. Perform Water analysis test, Water Pressure test and Water distribution system by using Pipe line.(NOS:PSC/NO133)
10. Align and lay humid pipe line of different dia. and fitting & maintenance of drainage pipe line. (NOS:PSC/NO135)
11. Install and maintain different Electric pumps. (NOS:PSC/NO135)
12. Join fittings for different purposes on PVC pipe line. (NOS:PSC/NO133)
13. Construct inspection chamber, manhole, gutter, septic tank, socket etc. (NOS:PSC/NO135)
14. Test pipe line as per site drainage pipe line layout. (NOS:PSC/NO135)
15. Perform removal of leakage pipe line. (NOS:PSC/NO133)
16. Install, fix & maintain different valve & cock. (NOS:PSC/NO136)
17. Install& maintain water metre and water supply for fixture. (NOS:PSC/NO133)
18. Demonstrate method of bending for different materials & different pipe joint. (NOS:PSC/NO133)
19. Perform fitting and maintenance of Fixture at different place. (NOS:PSC/NO136)

20. Carry out fitting, fixing & laying installation of hot & cold water pipe line and symbolizing. (NOS:PSC/NO133)
21. Perform repairing & reconditioning of waste pipe line. (NOS:PSC/NO133)
22. Perform repairing & reconditioning, scraping & painting of sanitary fittings pipe line. (NOS:PSC/NO133)
23. Read and apply engineering drawing for different application in the field of work.CSC/N9401
24. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. CSC/N9402

6. ASSESSMENT CRITERIA

LEARNING OUTCOMES	ASSESSMENT CRITERIA
1. 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. *[Basic fitting operation – marking, Hacksawing, Chiselling, Filing, Drilling, Taping and Grinding etc. Accuracy: ± 0.25mm]*(NOS:PSC/NO133v 1.0) (NOS:PSC/NO132) (NOS:PSC/NO134) (NOS:PSC/NO135), (NOS:PSC/ N9901 v 1.0)	Plan & Identify tools, instruments and equipment for marking and make this available for use in a timely manner.
	Select raw material and inspect visually for defects.
	Mark as per specification applying desired mathematical calculation and observing standard procedure.
	Measure all dimensions in accordance with standard specifications and tolerances.
	Identify Hand Tools for different fitting operations and make these available for use in a timely manner.
	Prepare the job for Hack sawing, chiselling, filing, drilling, tapping, grinding.
	Perform basic fitting operations viz., Hack sawing, filing, drilling, tapping and grinding to close tolerance as per specification to make the job.
	Observe safety procedure during above operation as per standard norms and company guidelines.
	Check for dimensional accuracy as per standard procedure.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
2. Perform Inner& Outer Thread cutting on Metal &Studs and then thread cutting on different types of pipes & fittings accessories. (NOS:PSC/NO133)	Identify Hand Tools for Plumber work.
	Identify Hand Tools for Cutting Inner thread and Outer thread.
	Identify the pipe fittings.
	Perform Inner thread cutting as per drawing.
	Perform Outer thread cutting as per drawing.
	Prepare the Pipe line circuit with fittings as per drawing.
	Observe safety procedure during thread cuttingas per standard norms and company guidelines.
	Check and verify the job as per drawing.
3. Carry out cutting of Pipes of different Dia in different angle and Joining of pipes by gas welding, Soldering and Brazing. (NOS:PSC/NO133)	Identify different components/parts of Gas (oxy-acetylene) machine, collect desired information and set each components/parts as per standard procedure.
	Observe safety/ precaution during operation.
	Select appropriate material & plan for gas cutting & joining operation.
	Cut & join metal parts / mechanical components as per specification observing standard procedure.

	Check cut portion/ joined part to ascertain proper welding.
	Identify hand tools for Soldering and Brazing.
	Mark and develop various forms as per drawing using sheet metals.
	Make of simple items with sheet metal as per drawing.
	Perform Soldering and Brazing.
	Observe safety procedure during operation
	Check and verify the job as per drawing.
4. Construct Masonry brick wall and RCC casting. Brick wall cutting for concealing pipe line.(NOS:PSC/NO133) (NOS:PSC/NO134) (NOS:PSC/NO134)	Identify different types of Mason's hand tools.
	Identify the Construction materials.
	Make a simple construction of different type of Brick joints with mortar.
	Prepare a job Masonry work and RCC casting as per drawing.
	Check & verify the job as per drawing.
5. Carry out Cutting and Bending of Pipes using Plumber's tools and equipment. (NOS:PSC/NO133)	Identify different types of Plumber's hand tools.
	Demonstrate care of hand tools.
	Cutting the pipe with Pipe cutter.
	Demonstrate working of Bending Machine and accessories.
	Make desired bend on pipe as per drawing.
	Check the job as per Drawing.
6. Join various type of PVC pipe by heat process or Welding. (NOS:PSC/NO133)	Identify different types of PVC Pipe.
	Demonstrate working of Electric Welding Machine and accessories for PVC pipes
	Simple joint of PVC pipe by Welding Machine.
	Making a job with PVC fittings and pipe as per drawing.
	Observe safety procedure during operation.
7. Construct complete pipe line circuit with different types of Joints and fixing Cocks & valve on Pipe line.(NOS:PSC/NO133)	Identify different types of Joints.
	Identify different types of tools different types of Joints.
	Make a Flange joint as per drawing.
	Make a Detachable joint as per drawing.
	Make a Spigot & Socket joint as per drawing.
	Make a Socket joint as per drawing.
	Identify GI fittings.
	Identify Cocks & Valves.
	Identify Tools for fixing of fittings with GI pipe, Cocks & Valves.
	Make a simple job on GI Pipe with fittings, Cocks, and Valves as per drawing.

	Check & verify the job as per drawing.
8. Carry out cutting of different Types of PVC Pipe, joining and laying.(NOS:PSC/NO133)	Identify Tools and materials for Cutting & Joining of PVC pipes.
	Make a job of Pipe line Circuit as per drawing.
	Check & verify the job as per drawing.
9. Perform water analysis test, Water Pressure test and Water distribution system by using Pipe line.(NOS:PSC/NO133)	Prepare water for test.
	Preparation of water analysis kits.
	Test water for pH, TDS, Temperature as per requirements.
	Preparation of Hydraulic Pressure Test Machine.
	Pressure test on Cistern and Tank.
	Check and verify test result.
10. Align and lay humid pipe line of different dia. and fitting & maintenance of drainage pipe line. (NOS:PSC/NO135)	Plan and identify tools, instrument and equipment for marking and make this available for use on a timed manner.
	Select of raw materials and visually inspect for defects.
	Check the defect of humid pipe line.
	Prepare the job, tools & raw materials.
	Observe safety procedure for desired operation as per standard norms and company guidelines.
	Check for dimensional accuracy as per standard procedure.
11. Install and maintain different Electric pumps. (NOS:PSC/NO135)	Select the pump and inspect for defects.
	Select the tools, instrument and equipment for the pump installation and repairing.
	Check and calculate output of the pumps.
	Install pump Observing standard procedure and method as per specification using appropriate tools and raw material.
	Check performance of the pump.
12. Join fittings for different purposes on PVC pipe line.(NOS:PSC/NO133)	Identify tools, instrument and equipment for marking and make this available for use in a timely manner.
	Mark as per specification applying desired mathematical calculation and observing standard procedure.
	Join fittings for desired purpose on PVC pipe line.
	Measure all dimensions in accordance with the drawing.
	Observe safety procedure during desired operation as per standard norms.
	Check for dimensional accuracy as per standard procedure.
13. Construct inspection chamber, manhole, gutter,	Plan and identify tools and equipment for desired purpose and make this available for use in a timely manner.

septic tank, socket etc. (NOS:PSC/NO135)	Select raw materials and inspect for defect.
	Mark as per drawing applying desired mathematical calculation and observing standard procedure.
	Construct inspection chamber, manhole, gutter, septic tank, socket etc. as per drawing.
	Measure all dimensions in accordance with standard specification and tolerance.
	Observe safety procedure during desired operation as per standard norms.
	Check for dimensional accuracy as per standard procedure.
14. Test pipe line as per site drainage pipe line layout. (NOS:PSC/NO135)	Identify tools and equipment for testing pipe line.
	Prepare the job for different testing for pipe line.
	Test pipe line observing standard procedure.
	Observe safety precaution during operation.
15. Perform removal of leakage pipe line.(NOS:PSC/NO133)	Identify the leakage pipe.
	Remove out pipe leakages as per standard procedure.
	Observe safety procedure during desired operation as per standard norms.
	Check performance after removal of leakages.
16. Install, fix &maintain different valve & cock.(NOS:PSC/NO136)	Plan and identify tools, instrument &equipment for Installation, fixing & maintenance of different valve & cock and make this available for use in a timely manner.
	Select valve and cock, inspect for defects.
	Install desired Valve & Cock observing standard procedure.
	Identify the problem with valve & cock fitted and solved the problem.
	Observe safety procedure during the operation as per standard norms.
	Check different parameters and functionality of the system.
17. Install &maintain water metre and water supply for fixture. (NOS:PSC/NO133)	Plan and identify tools, instrument &equipment for Installation, fixing & maintenance of different water meter and water supply for fixture and make this available for use in a timely manner.
	Select water meter and water supply for fixture, inspect for defects.
	Install desired water meter and water supply for fixture observing standard procedure.
	Identify the problem with water meter and water supply for fixture fitted and solved the problem.
	Observe safety procedure during the operation as per standard

	norms.
	Check different parameters and functionality of the system.
18. Demonstrate method of bending for different materials & different pipe joint. (NOS:PSC/NO133)	Plan and identify tools, instrument &equipment for marking and make this available for use in a timely manner.
	Select desired material and machine and inspect for defects.
	Bend G.I. pipe as per drawing and measurement.
	Bend PVC pipe of different diameter in different angle.
	Observe safety procedure during desired operation as per standard norms and schedule drawing.
	Check for dimensional accuracy as per drawing.
19. Perform fitting and maintenance of Fixture at different place (NOS:PSC/NO136)	Plan and identify tools, instrument &equipment for marking and make this available for use in a timely manner.
	Select raw material and inspect for defects.
	Cut & join C.I. pipe for waste pipe line in accordance with standard specification and drawing.
	Fix external soil pipe as per drawing observing standard procedure.
	Fix rain water gutter outlet and ground pipe as per standard norms and schedule drawing.
	Check different parameters and functionality of the system.
20. Carry out fitting, fixing & laying installation of hot & cold water pipe line and symbolizing. (NOS:PSC/NO133)	Plan and identify tools, instrument &equipment for desired work and make this available for use in a timely manner.
	Install pipe line for distribution of hot & cold water according to drawing.
	Install hot water system & solar water heating system in accordance with standard specification and drawing.
	Observe safety procedure during desired operation as per standard norms and schedule drawing.
	Check different parameters and functionality of the system.
21. Perform repairing & reconditioning of waste pipe line. (NOS:PSC/NO133)	Plan and identify tools, instrument &equipment for desired work and make this available for use in a timely manner.
	Perform fitting of different trap, valve, cistern etc.
	Construct over head tank as per drawing and measurement.
	Perform pressure test by hydraulic test machine.
	Observe safety procedure during desired operation as per standard norms and schedule drawing.
	Check different parameters and functionality of the system.
22. Perform repairing &	Plan and identify tools, instrument &equipment for desired work

reconditioning, scraping & painting of sanitary fittings pipe line. (NOS:PSC/NO133)	and make this available for use in a timely manner.
	Perform cleaning of sanitary pipe line and remove corrosion from pipe line.
	Remove corrosion from pipe line and Perform scraping & painting of pipe line in accordance with standard guidelines.
	Replace broken or cracked sanitary fitting.
	Observe safety procedure during desired operation as per standard norms and schedule drawing.
	Check different parameters and functionality of the system.
23. Read and apply engineering drawing for different application in the field of work.CSC/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.
24. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. CSC/N9401	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) 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.*[Basic fitting operation – marking, Hacksawing, Chiseling, Filing, Drilling, Taping, Threading and Grinding etc. Accuracy: ± 0.25mm]* (Mapped NOS:PSC/NO133v1.0, PSC/NO132, PSC/NO134, PSC/NO135, PSC/ N9901 v 1.0)	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)	• 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)
		11. Use Steel rule and Steel Tape for measuring, Use Scriber and Divider for marking on	• Plumber's common hand tools - names, description and material

		raw materials. (10hrs) 12. Demonstrate use of different types of Vice: - Bench vice, Pipe vice, Chain Vice, Hand vice, Chain Wrench. (20 hrs) 13. Demonstrate use of various Hand Tools: - Different Files, Hammer, Centre Punch, Hacksaw, Chisel, Callipers, Pipe Wrench, Stock & Dies, Taps and Holders. (20hrs)	from which they are made. • 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)
Professional Skill 15 Hrs; Professional Knowledge 06 Hrs	Perform Inner & Outer Thread cutting on Metal & Studs and thread cutting on different types of pipes & fittings accessories. (Mapped NOS:PSC/NO133)	14. Thread Inner on M.S. flat by using Tap.(5 hrs) 15. Use various locking device.(5 hrs) 16. Outer thread on Pipe by using Die. (3 hrs) 17. Fixing of different Pipe fittings in different position of Pipe. (2 hrs)	• 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)
Professional Skill 20Hrs; Professional Knowledge 08Hrs	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)	18. Cutting different diameter of MS pipes in different angles. (10 hrs) 19. Joining of Pipe in same dia by gas welding. (05hrs) 20. Joining of Pipes in different dia by gas welding. (05hrs)	**Gas Welding :-** • Purpose of Gas welding. • Method of gas welding • Safety precautions to be observed -Methods of soldering and brazing - fluxes used & Types of fluxes precautions to be

			observed. • Hard & soft solders - their properties, composition and uses. (08hrs)
Professional Skill 35Hrs; Professional Knowledge 08Hrs	Construct Masonry brick wall and RCC casting. Brick wall cutting for concealing pipe line. (Mapped NOS:PSC/NO133, PSC/NO134, PSC/NO134)	21. Demonstrate proper handling of Mason's hand tools: - Straight edge, Spirit level, Plumb bob, Square, Trowel etc. (5 hrs) 22. Setting out work with Tape, Rule, Square, Line pin and level as per drawing. (5hrs) 23. Prepare Cement mortars in different proportions to suit various purposes. (5 hrs) 24. Prepare Plane Cement Concrete and RCC in different proportions to suit various purposes. (5 hrs) 25. Benching and Channelling of base plate. (5hrs) 26. Damp proofing. (2 hrs) 27. Plastering the walls. (3 hrs) 28. Cutting of Masonry wall for concealing with Electric Cutting Tools. (5 hrs)	**Mason's works :-** • 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)
Professional Skill 40 Hrs; Professional Knowledge	Carry out Cutting and Bending of Pipes using Plumber's tools and equipment. (Mapped NOS:PSC/NO133)	29. Demonstrate proper handling of Plumber's Tools & Equipment. (05hrs) 30. Use and care of Plumber's Tools and Equipment.	• Description of plumber tools and Equipment- Ratchet brace, Threading die, Pipe wrench, sliding wrench,

10Hrs		(05hrs) 31. Cutting of G.I Pipes of different Diameter and Sizes by cutting tools. (05hrs) 32. Cutting of C.I Pipe of different Diameter and Sizes by cutting tools. (05hrs) 33. Cutting of all kinds of PVC Pipe of different Diameter and Sizes by cutting tools. (05 hrs) 34. Bending of G.I Pipe as per drawing using Bending Machine up to 50 mm dia. (10 hrs) 35. Bending of PVC Pipe as per drawing using heat process up to 50 mm dia. (5 hrs)	Spanner set, Chain Wrench etc. and their safety. • 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)	36. Preparation of PVC pipe & Fittings in different dia. (1 hr) 37. Preparation and precaution of Electric Hot Plate. (1hr) 38. PVC Pipe welding various dia, using welding machine. (13hrs) 39. Weld various type of PVC Pipe with various dia, using welding machine. (5hrs) 40. PPR pipe welding joint various dia of pipe using welding machine.(5hrs)	• 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)	41. CI/HCI Pipe Flange joint with Bend and Tee. (5hrs) 42. Socket joint of CI Pipes with lead. (5 hrs) 43. Detachable joint of AC pressure Pipe. (5 hrs) 44. Titan/Socket & Spigot joint of Ductile Iron (DI) Pipe with Rubber ring.(4hrs) 45. Prepare and Study the drawing of Pipe line circuit and schedule use of Tools and accessories.(2hrs)	• 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)	their uses. • 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)	• 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	**Composition of Water: -** • 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)	• 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)	• 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)	• 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)	• 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

Skill 75 Hrs; Professional Knowledge 14 Hrs	water meter and water supply for different fixtures. (Mapped NOS: PSC/NO133)	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)	drainage pipe system, • Installation of sanitary fitting s, 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)
Professional Skill 50Hrs; Professional Knowledge 05Hrs	Demonstrate method of bending for different materials & different pipe joint. (Mapped NOS: PSC/NO133)	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)	Method of bending galvanized mand other heavy pipes. (05hrs)
Professional Skill 50Hrs; Professional Knowledge 05Hrs	Perform fitting and maintenance of Fixture at different place. (Mapped NOS: PSC/NO136)	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	**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)

		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 :-** • 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– • 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: 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, substraction, 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 Core Skills subjects which is common for a group of trades, provided separately in www.bharatskills.gov.in /dgt.gov.in

ANNEXURE-I

LIST OF TOOLS AND EQUIPMENT			
PLUMBER (For Batch of 24 Candidates)			
Sl. No.	**Name of the Tool &Equipment**	**Specification**	**Quantity**
A. TRAINEES TOOL KIT			
1.	Rule Steel	300 mm both in inch and mm	25 Nos.
2.	Hacksaw Frame adjustable	250 to 300 mm	25 Nos.
3.	Scriber	200 mm	25 Nos.
4.	Centre punch	100 mm	25 Nos.
5.	Chisel Cold, flat	20 mm	25 Nos.
6.	Hammer ball peen	800 grams	25 Nos.
7.	File flat rough	300 mm	25 Nos.
8.	Level spirit wooden	300 mm	25 Nos.
9.	Plumb bob	50 grams	25 Nos.
10.	Trowel	C-125-I S: 6013	25 Nos.
11.	Stillson wrench	200 & 350 mm	25 Nos.
12.	Screw Driver	250 mm	25 Nos.
13.	Cutting pliers 200mm	I S : 3650	25 Nos.
14.	Steel tape	5m	25 Nos.
B. TOOLS, MEASURING INSTRUMENTS AND GENERAL SHOP OUTFIT			
15.	Hand Vice, Jaw	50 mm	2nos.
16.	File Flat, Smooth	200 mm	2nos.
17.	File Half Round, Rough	300 mm	2nos.
18.	File, Square, rough	250 mm	2nos.
19.	File, Square, Smooth	200 mm	2nos.
20.	File Triangular Rough	250 mm	2nos.
21.	File Flat Rasp	250 mm	2nos.
22.	File Triangular Smooth	200 mm	2nos.
23.	Chisel Cold Flat	20 mmX300mm	2nos.
24.	Chisel Cross Cut	6X150 mm I S-402	2nos.
25.	Chisel Round Nose	3X150 mm I S -402	2nos.
26.	Chisel Diamond Point	6X150mm	2nos.
27.	Punch, Letter set		1no.

28.	Punch , Number set		1no.
29.	Spanner monkey up to	50mm	2Nos.
30.	Cutter, Pipe, wheel type	6mm to 25mm	1 Nos.
31.	Oil stone	150X50X25mm	2 Nos
32.	Soldering Iron, Copper, Bit, Fire heated, Hatched, Straight	500 grams	4 Nos.
33.	Try square	200mm	2 Nos.
34.	Inside Caliper	150mm	2 Nos
35.	Caliper outside	150mm	2 Nos
36.	Odd leg caliper	200mm	2 Nos.
37.	Mirror	100X150 mm	2 Nos.
38.	Soil pot with brush		1 No.
39.	D. E. Spanners	7X8, 10X11, 13X17, 19X22, 24X27 IS:2028	2 Sets
40.	Bending Spring		1 Set
41.	Plumbers Laddle		2nos
42.	Tool caulking		2 nos.
43.	Plumbers' metal melting pot	10 kg	1 no.
44.	Pipe stock and dies complete with stocks, bushing, bushing holders, Taps and wrenches sizes covered, to suit pipes	bore dia 6, 8, 10, 20, 25, 32, 40 & 50 mm	4 sets
45.	Pipe vice	to grip up to 77 mm IS - 2587	8 nos.
46.	Stillson pattern pipe wrenches	450 mm to take pipe up to 52 mm dial S -4003	2sets
47.	Stillson pattern pipe wrenches	300mm to take pipe 20 mm to 32mm	2sets
48.	Chain :pipe wrench	90mm -650 IS 4123	2sets
49.	Adjustable, spanner, A-375, IS- 6149		2nos
50.	Pipe bender, manually operated		1no
51.	Leg vice, 75mm jaw on Stand IS -2588		1no
52.	Hand drill 6mm capacity with drill chuck (Electric)		1no
53.	Drill Twist (straight shank)	3mm to 6mm	1set
54.	working bench	2400x1200x750mm with 4 voice 125 mm jaws	2nos.
55.	Bath tub small size		1no.
56.	Wash Basin Equivalent metric	(16"X14"X10")	2nos.

57.	Water Heater	10 litres	1no
58.	Water closet (European type p) complete with overhead cistern		1set
59.	Water closet (Indian type) complete with overhead cistern		1set
60.	Urinal wall type complete with automatic system		1set
61.	Water meter		2nos.
62.	Steel lockers	with 8 drawers Metal rack (1800x1500x450mm)	3nos.
63.	Metal rack	(1800X1500X450mm)	1no
64.	Desk		12 nos.
65.	Black Board with glass		1no
66.	Fire Extinguisher		1no
67.	Fire Buckets with stand		1no
68.	Steel Almirah (large)		1no
69.	Hammering drilling machine		1no.
70.	Electric PPR pipe welding machine		1 No
71.	Electric pump	1 HP	1 no.
72.	Hydraulic pressure machine for testing leakage in GI pipe fittings etc.		1No.
73.	Rachet pipe die	15 mm to 32 mm	1 No.
74.	Double face hammers		2 No.
75.	Dormat, Pickaxe, Spade, Girmale		1 each
76.	Pipe bender (Hydraulic type)		1 No.
77.	Instructor table		1 No.
78.	Instructor chair		1 No.
79.	Solar water heater system		1No
80.	CPVC/UPVC Pipe cutter	Up to 50mm	10 nos
81.	Chase cutter (electric)	Blade dia 7cm to 15 cm	02 nos
82.	Caulking Tools	300 mm 20 mm	05 nos
C. LIST OF CONSUMABLES			
83.	M.S FLAT		As Required
84.	M.S ROD		As Required
85.	GI pipe "B" grade	½"Ø, ¾"Ø, 1"Ø	As Required
86.	GI pipe fittings Socket Tee	½"Ø, ¾"Ø, 1"Ø	As Required

	Bend Union Hex Nipple		
87.	River sand AFS	no.100 ~ 40	As Required
88.	Stone aggregate		As Required
89.	Cement portland		As Required
90.	PVC pipes heavy duty	(suitable to use dies and tap) ½"Ø, ¾"Ø, 1"Ø, 1½"Ø, 2"Ø , 4"Ø, 6" Ø	As Required
91.	PVC pipe light duty	½"Ø, ¾"Ø, 1"Ø, 1½"Ø, 2"Ø	As Required
92.	PVC fittings - reducer FTA Reducer, Plain coupling, TEE, Bend, Elbow, MTA, FTA, socket	½"Ø, ¾"Ø, 1"Ø, 1½"Ø, 2"Ø, 4"Ø, 6" Ø	As Required
93.	C.PVC pipe	20 mm Ø	As Required
94.	PPR pipe	20mm Ø	As Required
95.	Wheel valve		As Required
96.	Globe valve		As Required
97.	PVC ball valve		As Required
98.	Water tap/ PVC, S.S, Brass size	½", ¾", 1"	As Required
99.	Non- return valve, Air valve		As Required
100.	M.S flange		As Required
101.	Lubricating oil		As Required
102.	Lead		As Required
103.	Spum yarn		As Required
104.	Water meter		As Required
105.	PVC bend	100 mm	As Required
106.	PVC Y branch	100 mm	As Required
107.	PVC Dod bend	100 mm	As Required
108.	PVC pipe sloe		As Required
109.	C.P piller tap	15 mm	As Required
110.	C.P waste coupling	35 mm	As Required
111.	PVC waste pipe	32 mm	As Required
112.	PVC connection flexible tube		As Required
113.	Hot and cold water mixer tap		As Required
114.	PPR pipe fittings	PPR - TEE 20 mm PPR - Elbow 20 mm	As Required
115.	PVC floor trap		As Required
116.	PVC gully trap		As Required
117.	PVC multi trap		As Required
118.	PVC multi floor trap		As Required
119.	White cement		As Required
120.	P O P (Plaster of Paris)		As Required

121.	Push Cock		As Required
122.	Wall mounted water closet	With concealed flushing cistern	1set
123.	Wall mounted Bidet	With Hot and cold mixture	1set
124.	Urinal wall type	With automatic sensor flushing system	1set
125.	Bathroom concealed Diverter	Two way and three way both	1set
126.	Towel Rail (Stainless steel)	600 mm length	As Required
127.	C.P Piler tap	Automatic sensor type 15mm	As Required
128.	C.P Bib Tap/Cock	15 mm	As Required
129.	C.P Central hole automatic basin mixer	Sensor type 15mm	As Required
130.	C.P Shower	15mm	As Required
131.	Bricks	A Class	As Required
132.	Plastic water tank	500/750 liters	As Required
133.	Water tank overflow alarm	Automatic sensor type	As Required
134.	Butane/Propane disposable Cylinder	150-200 gm	10 nos
135.	Butane/Propane disposable blow torch	150-200 gm	05 nos
136.	Electronic light for Butane cylinder		02 nos
137.	Water Hammer Arrester		As Required

ABBREVIATIONS

CTS	Craftsmen Training Scheme
ATS	Apprenticeship Training Scheme
CITS	Craft 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