

# Competency Based Training (CBT) Curriculum Guide for Plumber and Pipe Fitter

[Market Oriented Short Term (MOST), Modular Curriculum]

Developed by:

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## 1. INTRODUCTION:

The TVET system has a large role to play in economic growth and social development as workforce provider to the labor market and as provider of skills to those who are looking for employment. In the case of Bangladesh, the TVET sector needs major reforms to ensure that issues of quality and capacity, relevance, and access are properly addressed.

This curriculum guide is designed and developed using competency based training (CBT) approach with the aim of producing skilled human resources for respective trade and occupation. This is based on the tasks to be performed for Plumber and Pipe Fitter occupation. The modules are included in course structure section of this curriculum guide. The training methodology is learner friendly where theoretical inputs, demonstration, guided and individual practices will be sufficiently provided to **master the skills at the industry standards**. Sufficient and updated tools and equipment will also be used during the training to provide hands on skills to the trainees. The curriculum guide is developed in consultation with the trainer, mid-level industry supervisors, and skilled workers. Curriculum Design Africa has been involved to develop the curriculum.

## 2. AIMS:

The main aim of this training program is to produce medium level skilled workforce (semi-skilled workers) required for the construction sector in the formal and informal sector and create better opportunities for employment and increased revenue.

## 3. OBJECTIVES:

At the end of the training course, the trainees will be able to:

- Practice Occupational Health and Safety (OHS) Procedure
- Apply Fundamental Skills of Plumbing and Pipe Fitting Works
- Perform Basic Plumbing and Pipe Fitting Work
- Install Fittings and Fixtures in Plumbing Works
- Repair & Maintenance of Plumbing Works

## 4. DESCRIPTION:

This is a competency based training package for the unemployed and underemployed workforce of Bangladesh. The curriculum is based on the tasks to be performed in the Plumber and Pipe Fitter occupation and subsequently these tasks have been grouped to form various modules. This will provide flexibility for the trainees to learn one module at a time. The modules are included in the 'Course Structure' section of this curriculum guide. The training methodology will be **learner-centered** where theoretical input, demonstration, guided and individual practices will sufficiently be provided to the trainees to **master their skills at business and industry standards**. Sufficient tools, equipment and aids will also be used during the training to provide hands on skills to the trainees.

## 5. COURSE STRUCTURE:

Job title: Plumber and Pipe Fitter				Time (hrs.)		
S.N.	Modules	Tasks	Nature	Th.	Pr.	Tot.
1	Practice Occupational Health and Safety (OHS) Procedure	5	T+P	2.5	3.5	6.0
2	Apply Fundamental Skills of Plumbing and Pipe Fitting Works	6	T+P	6.0	24.0	30.0
3	Perform Basic Plumbing and Pipe Fitting Work	5	T+P	3.0	26.0	29.0
4	Installation of Fittings and Fixtures in Plumbing Works	11	T+P	10.0	75.0	85.0
5	Repair & Maintenance of Plumbing Works	8	T+P	4.0	26.0	30.0
	<b>All total:</b>	<b>35</b>		<b>25.5</b>	<b>154.5</b>	<b>180</b>

Timings are subject to verification during pilot phase.

It should further be noted that although Health and Safety is dealt with as a separate module, the principles should be integrated into each task. It should be seen as a way of life and not an activity to be done during training only.

## 6. DURATION:

Total duration of the training is **180 hours** excluding soft skills and On-the-Job Training (OJT)/Apprenticeship. The participants will be sent for wage employment after completion of the training. Only technical modules have been considered under this duration.

## 7. TARGET GROUP:

The target group of this training course will be dropped out youths from the formal schooling, job seekers/underemployed young men or women, disadvantaged people. Male and female both are entitled to receive this training. The basic education for the trainees would be grade-V or equivalent. Above 18 years of age trainees will be enrolled in the training course.

## 8. GROUP SIZE:

A total of maximum 20 trainees will be placed in each group and provided adequate resources.

## 9. TARGET LOCATION:

The training will be implemented in partnership with private training providers situated in the different areas of the country.

**10. MEDIUM OF INSTRUCTION:**

The medium of instruction for this course will be Bangla but the trainees will be oriented on technical terminology in English.

**11. PATTERN OF ATTENDANCE:**

At least 90% attendee will be required during the theory and practical classes to appear in the internal and final assessment.

**12. FOCUS OF THE PROGRAM:**

Since this course is a competency based training, the focus is given on the performance of the trainees rather than the theoretical input. Where practicable, at least 80% of the total training time is allocated for practical training and 20% for theory.

**13. ENTRY CRITERIA:**

The following criteria will be considered for the individual to enter into this training program:

- Education: Class 5 or equivalent
- Age: 18 years and above
- Physical and mental health

**14. FOLLOW UP SUGGESTION:**

The training institutes who implement CBT program will build rapport with the employers to link graduates with the industries for employment.

Placement: Within one month after completion of the training program, the graduates will be assisted in finding out appropriate and decent wage-based job relevant to the occupation concerned.

To measure the success in job, the follow up will be taken as below:

First follow-up- three months after placement of graduates in job and the next follow up six months after placement of graduates in job.

**15. CERTIFICATE REQUIREMENT:**

Training service provider will certify the graduates as a Semi-Skilled Plumber and Pipe Fitter only after successful completion of the training program through systematic skills testing. Certification can also be linked to the Bangladesh Technical and Education Board (BTEB) at the relevant NTVQF level through Recognition of Prior Learning (RPL).

**16. TRAINEES EVALUATION DETAILS:**

Monthly evaluation will be conducted to ensure the performance of the learners. Final evaluation will be conducted to evaluate the participants at the end of the training course. Trainees must secure 100% marks in practical and 80% marks in theoretical examination.

**17. TRAINERS’ QUALIFICATION:**

Preference will be given to the trainer’s having the following criteria:

- Minimum five years’ experience in the respective occupation in the construction industry
- Working experience as an Instructor/Trainer
- Trade course/Diploma Building Construction Technology

**18. TRAINER – TRAINEES RATIO:**

- For theoretical class, trainer and trainee ratio should be 1:20.
- For practical class, trainer and trainee ratio should be 1:10.
- And for final practical assessment 1:1

**19. SUGGESTION FOR INSTRUCTION:**

Where practicable:

- At least 80% time of the course will be allocated for practical purpose
- At least 20% time of the course will be allocated for theoretical purpose
- Follow the safety rules
- Create a friendly learning environment
- Arrange the materials and equipment at the right place
- Trainer/Instructor will be available in the training classes/labs in time
- Take attendance of participants
- Learner centered training
- Encourage the participants to speak
- Arrange question and answer (Q&A) sessions
- Make plans for classroom / workshop instructions
- Prepare lesson plans for theoretical and practical classes

**20. LIST OF MODULES AND SUB MODULES:**

**Module: 1: Practice Occupational Health and Safety (OHS) Procedure**

**Module: 2: Apply Fundamental Skills of Plumbing and Pipe Fitting Works**

**Module: 3: Perform Basic Plumbing and Pipe Fitting Work**

**Module: 4: Installation of Fittings and Fixtures in Plumbing Works**

**Module: 5: Repair & Maintenance of Plumbing Works**

**21. MODULE SEQUENCE:**



**22. DETAILS OF MODULES AND SUB MODULES:**

# Module 1: Practice Occupational Health and Safety (OHS) Procedure

22.1. Module- 1: Practice Occupational Health and Safety (OHS) Procedure						
	<b>Description:</b> It consists of skills and knowledge related to occupational health and safety applicable to the related performance.			Hours		
	<b>Module outcomes:</b> After completion of this module, trainees will be able to <ul style="list-style-type: none"> <li>Follow safety sign and regulations</li> <li>Apply personal protective equipment</li> <li>Control house-keeping hazards</li> <li>Apply First Aid on minor injuries</li> </ul>			<b>Th.</b> <b>2.5</b>	<b>Pr.</b> <b>3.5</b>	<b>Tot.</b> <b>6.0</b>
1.	<b>Task:</b> Follow safety sign and regulations		<b>Terminal Performance Objective (TPO):</b>  <b>Given:</b> Simulated situation  <b>What:</b> Follow safety sign and regulations  <b>How well:</b> <ul style="list-style-type: none"> <li>All safety signs and regulations must be followed in the workplace</li> </ul>	Th. 0.5	Pr. 0.5	Tot. 1.0
	<b>Steps:</b> <ol style="list-style-type: none"> <li>Collect the safety sign, emergency exit plan and list of rules and regulation</li> <li>Explain the application of safety sign and regulation</li> <li>Follow the emergency exit plan</li> <li>Comply with safety signs and regulations</li> </ol>		<b>Enabling objectives:</b> <ul style="list-style-type: none"> <li>Explain about the uses of safety sign and regulation</li> <li>Explain how to use the regulation</li> <li>Explain what are the safety sign</li> <li>List the safety sign and regulation</li> <li>Use the all safety items and rules</li> <li>Explain the emergency exit way</li> </ul>			
	<b>Tools/equipment/materials required:</b> Safety sign, visual aids, danger zone area indicators and regulation charts					
2.	<b>Task:</b> Apply personal protective equipment		<b>Terminal Performance Objective (TPO):</b>  <b>Given:</b> Protective equipment  <b>What:</b> Apply personal protective equipment	Th. 0.5	Pr. 1.0	Tot. 1.5



		<p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• The status of the protective equipment must be checked</li> <li>• Safety goggle, helmet, gloves to be worn at all times during execution of tasks and safety belt must be tightened properly</li> </ul>			
	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect the personal protective equipment</li> <li>2. Check the condition of protective equipment</li> <li>3. Use the protective equipment</li> <li>4. Maintain the protective equipment</li> <li>5. Preserve the protective equipment in organized way at safe place</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• Explain about the uses of protective equipment</li> <li>• Explain how to use the protective equipment</li> <li>• Explain what are the protective equipment in hazards works</li> <li>• Use the protective equipment properly</li> <li>• Explain the positive and negative side of uses the protective equipment</li> <li>• List the protective equipment</li> </ul>			
	<p><b>Tools/equipment/materials required:</b> Hamlet, Life Jacket, Safety Goggles, Hand Gloves, Safety Belt and Safety shoes/Gumboot.</p>				
3.	<p><b>Task:</b> Control house-keeping hazards</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Simulated situation</p> <p><b>What:</b> Control house-keeping hazards</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Tools, equipment and safety materials of workplace must be placed in organized way</li> <li>• The periodical maintenance of tools, equipment and safety materials of workplace must be done.</li> </ul>	Th. 0.5	Pr. 0.5	Tot. 1.0

	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. List the expected hazards exist in workplace</li> <li>2. Place the tools and equipment in workplace following organized way</li> <li>3. Follow up the periodic maintenance of tools and equipment</li> <li>4. Handle the tools/equipment carefully</li> <li>5. Follow up the maintenance of all the electrical fittings and fixtures</li> <li>6. Identify the faulty tools/equipment</li> <li>7. Dispose the wastage/outdated tools &amp; equipment from workplace</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• Define house-keeping hazards</li> <li>• Identify the types of housekeeping hazards</li> <li>• Explain the necessity of keeping the house neat and clean (including dinning place, washroom/toilets, store and exit path)</li> <li>• Understand safety precautions to be taken for housekeeping hazards</li> <li>• List the expected house-keeping hazards in the workplace</li> </ul>			
<p><b>Tools/equipment/materials required:</b> Tools and equipment including safety materials.</p>					
4.	<p><b>Task:</b> Apply First Aid on minor injuries</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Dummy of a simulated victim</p> <p><b>What:</b> Apply First Aid on minor injuries</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Injured person must be isolated from the crowd</li> <li>• Information of accident must be given to the administration</li> </ul>	Th. 0.5	Pr. 1.0	Tot. 1.5
<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Isolate the injured person</li> <li>2. Collect first aid box with necessary medicine, materials and equipment</li> <li>3. Clean the injured area</li> </ol>		<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• Define the minor injury</li> <li>• Explain about the first aid treatment</li> <li>• Describe the steps of dressing</li> <li>• List out the first aid medicine, equipment and materials</li> </ul>			

	<p>4. Dress the injured portion properly</p> <p>5. Use the necessary medicine and other materials as per requirement</p> <p>6. Inform the administration</p> <p>7. Restore the First Aid Box</p>				
<b>Tools/equipment/materials required:</b> First Aid Box with required medicine and materials					
5.	<b>Task:</b> Control Electrical Fire Hazards	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Work place situation (real/simulation)</p> <p><b>What:</b> Control Electrical Fire Hazards</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Firefighting aids must be checked periodically</li> <li>• Emergency exit must be followed during evacuation</li> </ul>	Th. 0.5	Pr. 0.5	Tot. 1.0
	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Check the availability of fire extinguishers, sands buckets/ reservoir</li> <li>2. Wear safety device to work closed to the electrification area.</li> <li>3. Check the fire extinguisher</li> <li>4. Apply fire extinguisher during small electric fire.</li> <li>5. Inform the police and fire station for mass electric fire</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• Describe the possible electrical fire hazards in workplace</li> <li>• List the types of electrical hazards</li> </ul>			
<b>Tools/equipment/materials required:</b> Safety materials like fire Extinguisher, Sands, Vacuum cleaner/hand blower etc.					

## Module 2: Apply Fundamentals Skills of Plumbing & Pipe Fitting Works

22.2. Module- 2: Apply Fundamental Skills of Plumbing & Pipe Fitting Works						
	<b>Description:</b> This module covers basic skills and knowledge about plumbing and pipe fitting. It provides skills to identify plumbing materials, fittings, valves and materials. Application of hand and power tools used in plumbing and pipe fitting works. Interpretation plumbing signs, symbols and specifications. Measuring different types of shapes and preparation of layout for plumbing fittings as per working drawing.			Hours		
	<b>Module outcomes:</b> After completion of this module, trainees will be able to: <ul style="list-style-type: none"> <li>Identify plumbing materials, fittings, valves and fixtures</li> <li>Apply hand tools for plumbing works</li> <li>Apply power tools for plumbing works</li> <li>Interpret plumbing sign, symbols and specifications from working drawing</li> <li>Measure the different shapes using measuring tools</li> <li>Prepare layout for plumbing fittings as per working drawing</li> </ul>			<b>Th.</b> <b>6.0</b>	<b>Pr.</b> <b>24.0</b>	<b>Tot.</b> <b>30.0</b>
1.	<b>Task:</b> Identify plumbing materials, fittings, valves and fixtures	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Different types plumbing materials, fittings, valves and fixtures</p> <p><b>What:</b> Identify plumbing materials, fittings, valves and fixtures</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>Plumbing materials, fittings, valves and fixtures are identified and labeled.</li> </ul>	Th. 1.0	Pr. 5.0	Tot. 6.0	
	<b>Steps:</b> <ol style="list-style-type: none"> <li>Collect different types of masonry materials, fittings, valves and fixtures.</li> <li>Place them separately on the table.</li> <li>Identify the plumbing materials, plumbing fittings,</li> </ol>	<b>Enabling objectives:</b> <ul style="list-style-type: none"> <li>Discriminate the plumbing materials, fixtures, valves and fittings.</li> <li>List out the plumbing materials and their specification</li> <li>List out the fittings and their application</li> <li>List out the different types of valve and their functions</li> <li>List out the name of fixtures and their uses.</li> </ul>				

	<p>Identify plumbing valves and plumbing fixtures.</p> <p>4. List out the name of each material fitting, valves and fixture with label.</p> <p>5. Restore the material, fittings, valves and fixtures.</p> <p>6. Clean the workplace.</p>				
<p><b>Tools/equipment/materials required:</b> Galvanized Iron (GI) Pipe, Cast Iron (CI) Pipe, Polyvinyl, Chloride (PVC) Pipe , Un-plasticized Polyvinyl Chloride (UPVC) Pipe, Chlorinated Polyvinyl Chloride (CPVC), Polypropylene Random (PPR) Pipe, elbow, bend (45<sup>0</sup>, 90<sup>0</sup>), Tee (Cross tee, Y tee) union, socket, reducer, long trap, S-trap, P- trap, U- trap, nipple, adapter (male, female) bush, clamp, bib cock, angle stop cock, conceal stop cock, mixture bib cock, plug, gate valve, check valve, glove valve, ball valve, foot valve, safety valve, butterfly valve, float valve, pressure relief valve, non-return valve, commode, pan, sink, bathtub, shower, low down, water closet, basin, soap case, towel rail, mirror etc.</p>					
2.	<p><b>Task:</b> Apply hand tools for the plumbing works</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Different types of hand tools</p> <p><b>What:</b> Apply hand tools for the plumbing works</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Safety precaution must be taken while using hand tools</li> <li>• Appropriate tools must be selected for specific job</li> </ul>	Th. 1.0	Pr. 6.0	Tot. 7.0
<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Identify the nature of the job.</li> <li>2. Select the appropriate hand tool as per nature of the job.</li> <li>3. Apply hand tool for specific work.</li> <li>4. Clean the tools after use.</li> <li>5. Clean the workplace.</li> <li>6. Restore the materials.</li> </ol>		<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• Explain the functions of hand tools used for plumbing works</li> <li>• Explain the application of hand tools for plumbing works</li> </ul>			
<p><b>Tools/equipment/materials required:</b> Measuring tape, Ball pin hammer, soft hammer, brick hammer, C-clamp, claw hammer, flat screwdriver, star screw driver (Philips Screwdriver), adjustable spanner, pipe wrench, pipe cutter, hack saw, hand saw, pipe vice, water level, spirit level, pipe reamer, plumb</p>					

	bob, chisel, hand die stock, punch, hand drill (manual), Try square, flat file, round file , half round file, square file, center punch, number punch, scriber.				
3.	<b>Task:</b> Apply power tools for the plumbing works	<b>Terminal Performance Objective (TPO):</b>  <b>Given:</b> Different types of power tools for the plumbing works  <b>What:</b> Apply power tools for the plumbing works  <b>How well:</b> <ul style="list-style-type: none"> <li>• Safety precaution must be taken while working with power tools</li> <li>• Appropriate power tools must be selected for specific job</li> <li>• Power tools must be switched OFF/ON while it is operated</li> </ul>	Th. 1.0	Pr. 3.0	Tot. 4.0
	<b>Steps:</b> <ol style="list-style-type: none"> <li>1. Identify the nature of the job.</li> <li>2. Select the power tool as per the nature of the job.</li> <li>3. Prepare the power tool for working.</li> <li>4. Connect the power cable with the power source.</li> <li>5. Switch ON the power tool.</li> <li>6. Apply power tool as per nature of the job.</li> <li>7. Switch OFF the power tool.</li> <li>8. Clean the power tool.</li> <li>9. Clean the work place.</li> <li>10. Restore the power tool.</li> </ol>	<b>Enabling objectives:</b> <ul style="list-style-type: none"> <li>• Explain the name of power tools for plumbing works</li> <li>• Explain the application of different types of power</li> </ul>			
	<b>Tools/equipment/materials required:</b> Grinding machine, electric hand drill, breaker machine, heat gun, PPR welding device etc.				
4.	<b>Task:</b> Maintain tools & equipment	<b>Terminal Performance Objective (TPO):</b>	Th. 1.0	Pr. 3.0	Tot. 4.0

		<p><b>Given:</b> Different types of tools &amp; equipment</p> <p><b>What:</b> Maintain tools &amp; equipment</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Tools &amp; equipment are inspected and repaired periodically</li> <li>• No damage will be made while maintaining tools, equipment</li> </ul>			
	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect tools and equipment.</li> <li>2. Check each tools and equipment individually.</li> <li>3. Sharpen the cutting tools.</li> <li>4. Remove dust and other unwanted materials from tools &amp; equipment.</li> <li>5. Wash the tools and materials with clean water.</li> <li>6. Dry the tools and equipment.</li> <li>7. Check the faults of tools and equipment.</li> <li>8. Repair the minor faults.</li> <li>9. Segregate nonfunctional tools &amp; equipment from the store.</li> <li>10. Restore the tools &amp; equipment.</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• Explain how to maintain tools &amp; equipment</li> <li>• Explain preventive maintenance methods, techniques and procedure.</li> <li>• Explain the necessity of maintaining the tools &amp; equipment.</li> </ul>			
	<p><b>Tools/equipment/materials required:</b> Measuring tape, Ball pin hammer, soft hammer, flat screwdriver, star screw driver (Philips Screwdriver), adjustable spanner, pipe wrench, pipe cutter, hack saw, hand saw, pipe vice, water level, spirit level, pipe reamer, plumb bob, chisel, hand die stock, punch, hand drill (manual), Try square, flat file, round file , half round file, square file, round file, grinding machine, electric hand drill, pedestal drill, breaker machine, hydraulic pipe bender, heat gun, PPR welding device, combination pliers, cutting pliers, nose pliers etc</p>				
5.	<p><b>Task:</b> Interpret plumbing sign, symbol and specifications from working drawing</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Plumbing drawing ,</p>	Th. 1.0	Pr. 2.0	Tot. 3.0



		<p><b>What:</b> Interpret plumbing sign, symbol and specifications from working drawing</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Specifications and abbreviations are identified and explained</li> <li>• Signs and symbols are identified and explained</li> </ul>			
	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Identify relevant drawings and specification.</li> <li>2. Identify the terms and abbreviations.</li> <li>3. Identify signs and symbols.</li> <li>4. Interpret drawing and specification.</li> <li>5. Interpret schedules, dimensions contain in the drawing.</li> <li>6. Restore the drawings in a dry and safe place.</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• State the different types of plumbing signs, symbols and specifications</li> <li>• Explain application of signs and symbols</li> </ul>			
<p><b>Tools/equipment/materials required:</b> Technical drawing</p>					
6.	<p><b>Task:</b> Measure the different shapes using measuring tools</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Measuring tools, different shapes</p> <p><b>What:</b> Measure the different shapes using measuring tools</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Measurement error must be within <math>\pm 1</math> mm</li> </ul>	Th. 1.0	Pr. 5.0	Tot. 6.0
	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect measuring tools and different shapes i.e. straight</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• Define straight line,</li> <li>• Define radius diameter and area of circle</li> <li>• Describe the functions of measuring instruments</li> </ul>			

	<p>line, circular shape and rectangular shape.</p> <ol style="list-style-type: none"> <li>2. Measure the length, wide and height of the shape</li> <li>3. Measure the diameter of the shape</li> <li>4. Note the reading of measurement.</li> <li>5. Restore the tools &amp; shapes</li> </ol>	<ul style="list-style-type: none"> <li>• Explain the procedure of measuring length</li> <li>• Explain the procedure of measuring diameter of circle</li> <li>• Explain the procedure of using slide calipers</li> </ul>
<p><b>Tools/equipment/materials required:</b> Measuring tape, foot role, inside calipers, outside calipers, different shapes (straight line, circle)</p>		

## Module 3: Perform Basic Plumbing & Pipe Fitting Work

### 22.3. Module- 3: Perform Basic Plumbing and Pipe Fitting Work

	<p><b>Description:</b> This module covers basic skills and knowledge about plumbing and pipe fitting works. It provides skills to cut pipes according to the measurement, cut external thread on pipes, making various joints on PVC pipe, UPVC pipe, CPVC pipe, PPR pipe and GI pipe.</p>	Hours			
	<p><b>Module outcomes:</b> After completion of this module, trainees will be able to:</p> <ul style="list-style-type: none"> <li>• Cut pipes according to the measurement</li> <li>• Cut external thread on pipe</li> <li>• Make Joints of joints of PVC pipe</li> <li>• Make joints of CPVC/UPVC pipe</li> <li>• Make joints of GI pipe</li> <li>• Make Joints of PPR pipe</li> </ul>	<b>Th.</b> <b>3.0</b>	<b>Pr.</b> <b>26.0</b>	<b>Tot.</b> <b>29.0</b>	
1.	<p><b>Task:</b> Cut pipes according to the measurement.</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Tools, materials, equipment and working place.</p> <p><b>What:</b> Cut different types of pipes according to the measurement.</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Measurement error must be within <math>\pm 2\text{mm}</math></li> <li>• Pipe must be cut uniformly one end to another end</li> </ul>	Th. 1.0	Pr. 6.0	Tot. 7.0
	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect tools, materials and drawing.</li> <li>2. Place pipe vice on the ground</li> <li>3. Mark the cutting point of the pipe as per measurement using marker pen</li> <li>4. Fix pipe firmly with the grip of pipe vice</li> <li>5. Cut the pipe using pipe cutter or hack saw or hand saw depending on the types of pipe</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• Explain the procedure of cutting pipe</li> <li>• Explain the difference of different types of pipe</li> </ul>			

	<p>6. Remove pipe from the pipe vice.</p> <p>7. Clean the work place.</p> <p>8. Restore all tools and materials.</p>				
<p><b>Tools/equipment/materials required:</b> Galvanized Iron (GI) pipe, Cast Iron (CI) pipe, Polyvinyl Chloride (PVC), measurement tape, PVC hand saw, pipe vice, marker pen, pipe cutter and hacksaw.</p>					
2.	<p><b>Task:</b> Cut external thread on GI pipe.</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Tools, equipment and materials</p> <p><b>What:</b> Cut external thread on GI pipe.</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Thread must be uniform.</li> <li>• Thread per inch (TPI) must be 14 for ½ and ¾ inch diameter pipe</li> <li>• Thread per inch (TPI) must be 11 for 1 inch diameter pipe</li> <li>• Thread must not be broken.</li> </ul>	Th. 0.5	Pr. 6.5	Tot. 7.0
<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect tools, materials and equipment.</li> <li>2. Place pipe vice on the ground</li> <li>3. Fix the GI pipe into the vice</li> <li>4. Adjust die stock as per diameter of the pipe</li> <li>5. Insert die stock into the pipe</li> <li>6. Rotate the die stock in clockwise direction.</li> <li>7. Apply lubricant on the pipe.</li> <li>8. Rotate the die stock anti-clockwise after four to five times clockwise turn.</li> <li>9. Cut thread until one or two thread out of die is visible.</li> <li>10. Remove the die set from the pipe.</li> </ol>		<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• Explain the operation diestock.</li> <li>• Explain about clock wise and anti-clockwise direction.</li> </ul>			

	11. Clean thread and workplace 12. Restore all tools and materials.				
<b>Tools/equipment/materials required:</b> GI pipe, pipe vice, die stock, lubricant, round file etc.					
3.	<b>Task:</b> Make Joints of PVC/GI pipe	<b>Terminal Performance Objective (TPO):</b>	Th. 0.5	Pr. 4.5	Tot. 5.0
		<b>Given:</b> Tools, equipment's and materials			
		<b>What:</b> Make Joints of PVC pipe			
		<b>How well:</b>			
		<ul style="list-style-type: none"> <li>• Thread length must be done as per measurement.</li> <li>• Teflon tape must be spired</li> <li>• Joints must be attached firmly with pipe</li> <li>• Leakage test must be done using water</li> </ul>			
	<b>Steps:</b>	<b>Enabling objectives:</b>			
	<ol style="list-style-type: none"> <li>1. Collect tools, materials and equipment.</li> <li>2. Cut the pipe as per required measurement using pipe cutter or hand saw.</li> <li>3. Cut external thread as per requirement on pipe using die stock.</li> <li>4. Spire the Teflon tape clockwise (opposite to threading direction) on the external tread of pipe</li> <li>5. Attach required fittings with the PVC pipe to make joints i.e. union, Y joint, Tee joint, socket joint.</li> <li>6. Tighten the fittings with using pipe wrench.</li> <li>7. Conduct leakage test using water</li> <li>8. Clean the work place</li> </ol>	<ul style="list-style-type: none"> <li>• Explain the procedure of fittings joints.</li> <li>• Explain safety precaution of fitting joints.</li> </ul>			

	9. Restore the tools equipment and materials.				
<b>Tools/equipment/materials required:</b> PVC pipe, GI pipe, Teflon tape, pipe wrench, union, Y joint, Tee , socket joint, pipe cutter, hack saw, die stock					
4.	<b>Task:</b> Make Joints of CPVC/ UPVC pipe	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Tools, equipment and materials</p> <p><b>What:</b> Make Joints of CPVC/UPVC pipe</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Cutting must be uniform one end to another end</li> <li>• Apply primer and solvent cement uniformly on the pipe and joint.</li> <li>• Leakage test must be done using water</li> </ul>	Th. 0.5	Pr. 4.5	Tot. 5.0
	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect tools, materials and equipment.</li> <li>2. Cut the pipe as per required measurement with pipe cutter or hand saw.</li> <li>3. Remove uneven pieces and burrs created from sawing using sand paper.</li> <li>4. Wipe CPVC/uPVC primer as appropriate onto the outside of the pipe segment and the inside of the pipe fitting.</li> <li>5. Wipe an even layer of solvent cement on the outside of the pipe segment and the inside of the pipe fitting using brush.</li> <li>6. Attach pipe inside the fittings and give a quarter turn twist</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• List out the required materials for making joints</li> <li>• Explain the procedure of making joints of CPVC/uPVC pipe.</li> </ul>			

	<p>and hold fifteen seconds to set the cement.</p> <p>7. Conduct leakage test using water</p> <p>8. Clean the workplace</p> <p>9. Restore the tools equipment and materials.</p>				
<b>Tools/equipment/materials required:</b> CPVC pipe, UPVC pipe, Teflon tape, union, Y joint, Tee socket joint, primer, solvent cement, 80 grade sand paper. etc.					
5.	Task: Make Joints of PPR pipe	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Tools, equipment and materials</p> <p><b>What:</b> Make joints of PPR pipe</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• PPR pipe must be cut uniformly one end to another end</li> <li>• Machine must be connected with 220/230 A.C. power.</li> <li>• Operating Temperature of machine must be kept 260 Deg. C.</li> <li>• Pipe must be fixed with fittings firmly.</li> <li>• Leakage test must be done using water</li> </ul>	Th. 0.5	Pr. 4.5	Tot. 5.0
	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect tools, materials and equipment.</li> <li>2. Cut the pipe as per required measurement with pipe cutter or hack saw.</li> <li>3. Mark welding depth at the end of pipes</li> <li>4. Mount the suitable dies on heating element of welding machine according to the</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• List out the required tools, equipment and materials for making PPR joints</li> <li>• Explain the function of PPR welding machine.</li> <li>• Explain the procedure of PPR joint making with fittings.</li> </ul>			



	<p>diameter of Pipe and fitting to be welded.</p> <ol style="list-style-type: none"> <li>5. Connect the welding machine to 220/230 volts A.C. power supply.</li> <li>6. Select 260 Deg. C. temperature on the welding machine thermostat.</li> <li>7. Wait for reaching the required working temperature.</li> <li>8. Insert the pipe and the fitting in the dies.</li> <li>9. Insert pipe into the fitting by exerting light pressure.</li> <li>10. Conduct leakage test using water</li> <li>11. Clean the workplace</li> <li>12. Restore the tools equipment and materials.</li> </ol>	
<p><b>Tools/equipment/materials required:</b> PPR pipe, union, Y joint, Tee socket joint, pipe cutter/hack saw, PPR welding machine.</p>		

## Module 4: Installation of Fittings and Fixtures in Plumbing Works

## 22.4. Module- 4: Installation of Fittings and Fixtures in Plumbing Works.

22.4. Module- 4: Installation of Fittings and Fixtures in Plumbing Works.					
	<b>Description:</b> This module deals with the skills and knowledge required for a Plumber and Pipe Fitter in the areas of installation of different types of fittings of plumbing works. Trainees also get the proper knowledge to use the safety materials during works.	Hours			
	<b>Module outcomes:</b> After completion of this module, trainees will be able to install- <ul style="list-style-type: none"> <li>• Service Pipe Line</li> <li>• Different types of valves with fittings</li> <li>• Commode with fittings</li> <li>• Waste water line with fittings</li> <li>• Washbasin with fittings</li> <li>• Pan</li> <li>• Sink</li> <li>• Water tap (bibcock/CP tap)</li> <li>• Water pump</li> <li>• Water tank</li> <li>• Stand-alone shower</li> </ul>	<b>Th.</b> <b>10.0</b>	<b>Pr.</b> <b>75.0</b>	<b>Tot.</b> <b>85.0</b>	
1.	<b>Task:</b> Install Service Pipe Line	<b>Terminal Performance Objective (TPO):</b>  <b>Given:</b> Simulated work site and Necessary tools & materials.  <b>What:</b> Install Service Pipe Line  <b>How well:</b> <ul style="list-style-type: none"> <li>• Water pipe line must be placed in straight alignment.</li> <li>• G.I. pipe must be placed in secure.</li> <li>• Installed pipe line must be kept free from leakage</li> </ul>	Th. 1.0	Pr. 9.0	Tot. 10.0
	<b>Steps:</b>	<b>Enabling objectives:</b> <ul style="list-style-type: none"> <li>• List the required tools &amp; materials.</li> <li>• Explain how to take measurement drawing.</li> </ul>			

	<ol style="list-style-type: none"> <li>1. Collect tools, material &amp; drawing/catalog.</li> <li>2. Mark positions as per drawing.</li> <li>3. Chase into wall and floor as per layout drawing.</li> <li>4. Cut pipe as per measurement using pipe cutter.</li> <li>5. Adjust die-stock as per diameter of pipe.</li> <li>6. Cut external thread as per layout using die-stock.</li> <li>7. Use color &amp; thread tapes in the thread area of pipe.</li> <li>8. Connect fittings with GI pipe.</li> <li>9. Fix GI pipe in the wall using nail.</li> <li>10. Conduct leakage test using water.</li> <li>11. Clean the workplace.</li> <li>12. Restore tools &amp; materials.</li> </ol>	<ul style="list-style-type: none"> <li>• Explain the functions of service pipe</li> <li>• Explain the function of different types of fittings (band, elbow, socket, T, union).</li> <li>• Explain the steps to install service pipe line.</li> <li>• Explain how to check the performance of water line.</li> <li>• Discuss why G.I pipe is used for cold water supply</li> </ul>			
<p><b>Tools/equipment/materials required:</b> Measuring instruments, marking instrument, grinding machine, pipe range, chisel, hammer, flat file, die-stock, oil-can, steel wire brush, elbow, bend, socket, T, union, Thread tape, G.I pipe.</p>					
2.	<p><b>Task:</b> Install Valves With Pipe</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Simulated work site/ Workshop, Valves and necessary tools &amp; materials.</p> <p><b>What:</b> Install Valves With Pipe</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Installed valves are placed in straight alignment.</li> <li>• <b>Non- return</b> valve must be placed according to the direction mentioned in valve.</li> </ul>	Th. 1.0	Pr. 9.0	Tot. 10.0

		<ul style="list-style-type: none"> <li>Valve must be operated without leakage.</li> </ul>			
	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect tools, material &amp; drawing layout.</li> <li>2. Mark the work area as per layout.</li> <li>3. Fix pipe with pipe vice.</li> <li>4. Cut the pipe as per measurement and layout.</li> <li>5. Adjust die-stock as per diameter of pipe.</li> <li>6. Cut thread on GI pipe.</li> <li>7. Use color &amp; thread tapes in the thread area of pipe.</li> <li>8. Fix valve with GI pipe following clockwise.</li> <li>9. Fix clamp in GI pipe as per requirement.</li> <li>10. Check the connection point of valve.</li> <li>11. Switch ON/OFF the valve &amp; check the performance.</li> <li>12. Clean the workplace.</li> <li>13. Restore tools &amp; materials.</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>List the required tools &amp; materials.</li> <li>Explain how to take measurement in drawing area.</li> <li>Explain the function of different types of valves.</li> <li>Describe the application of different types of valves.</li> <li>Explain the steps to install valves.</li> <li>Explain how to check the performance of valves.</li> </ul>			
	<p><b>Tools/equipment/materials required:</b> Adjustable pipe wrench, Adjustable wrench, Die- stock, Pipe vice, Pipe cutter, G.I Pipe, Different types of valve (Butterfly, Gate, Ball, Check, foot, angle, safety, glove, float, pressure relief, Non-return Valve) Thread tape, Color, Oil-can.</p>				
3.	<p><b>Task:</b> Install Commode With Fittings</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Site and Necessary tools, Materials &amp; Commode and fittings.</p> <p><b>What:</b> Install Commode with Fittings</p> <p><b>How well:</b></p>	Th. 1.0	Pr. 6.0	Tot. 7.0

		<ul style="list-style-type: none"> <li>• Commode must be placed as per drawing and layout.</li> <li>• Water leakage test must be conducted and shower must function easily.</li> <li>• Commode must be leveled</li> </ul>			
	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect commode set, necessary tools, materials &amp; drawing.</li> <li>2. Mark the floor and wall area as per layout.</li> <li>3. Cut the floor/wall as per measurement and drawing.</li> <li>4. Place the commode on the floor to mark the drill point on the floor.</li> <li>5. Drill the marking points using drill machine.</li> <li>6. Put the rowel plug into the hole.</li> <li>7. Place the commode on the floor.</li> <li>8. Put the commode screw in the drilling point and tighten properly.</li> <li>9. Fix the seat and seat cover with commode.</li> <li>10. Level the installation area of commode using white cement mixture</li> <li>11. Connect soil line with commode as per layout.</li> <li>12. Connect angle valve with cistern and commode using connection pipe.</li> <li>13. Mark the area to set the push shower</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• List the required tools &amp; materials.</li> <li>• Explain different types of commode</li> <li>• Explain the functions and application of drill machine</li> <li>• Describe the how to adjust of cistern.</li> <li>• Explain the steps to install commode.</li> <li>• Explain how to check the performance of commode.</li> </ul>			

	<p>14. Drill the drilling point using drill machine to fix the push shower.</p> <p>15. Fix push shower stand with screw.</p> <p>16. Connect the push shower with two-in-one bibcock.</p> <p>17. Switch ON/OFF the commode low down and push shower &amp; check the performance.</p> <p>18. Clean the workplace.</p> <p>19. Restore tools &amp; materials.</p>				
<p><b>Tools/equipment/materials required:</b> Hammer, Chisel, Drill machine, Pencil, Measurement tape, Screw driver/ Slide wrench, Commode set, Push shower, angle stop cock, connection pipe, cement.</p>					
4.	<p><b>Task:</b> Install Waste Water Line with fittings.</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Simulated work Site and Necessary tools, Materials. Pipe &amp; fittings.</p> <p><b>What:</b> Install waste water Line with fittings.</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Installation of waste water line must be placed according to the drawing layout.</li> <li>• Water leakage test must be done.</li> <li>• No blockage found in water pipe line</li> </ul>	Th. 1.0	Pr. 7.0	Tot. 8.0
<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect uPVC, pipe, tools, materials &amp; drawing.</li> <li>2. Mark the area as per layout.</li> <li>3. Chase the floor/wall using chisel and hammer/ cold</li> </ol>		<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• List the required tools &amp; materials.</li> <li>• Describe the source of waste water.</li> <li>• Explain different type of waste water pipe.</li> <li>• Explain the process to install waste water line.</li> <li>• Explain how to check the performance of waste water line</li> </ul>			

	<p>cutting machine/ breaker machine as per drawing.</p> <ol style="list-style-type: none"> <li>4. Cut the pipe for waste line as per measurement and layout.</li> <li>5. Remove dust for pipe and fittings using jhut cloth</li> <li>6. Apply solution on outer side of pipe and inner portion of the fittings.</li> <li>7. Connect the pipe with fittings</li> <li>8. Mark the points for drilling points.</li> <li>9. Drill the marking points</li> <li>10. Install pipe with clamp.</li> <li>11. Put the rowel plug into the hole</li> <li>12. Fix pipe with clamp using screw.</li> <li>13. Connect cowl with pipe on the top floor.</li> <li>14. Conduct leakage test using water.</li> <li>15. Clean the workplace.</li> <li>16. Restore tools &amp; materials.</li> </ol>				
<p><b>Tools/equipment/materials required:</b> Measurement tape, Hacksaw frame, Drill machine, screw, screw driver, clamp, Hammer, Chisel, Solution (gum), different diameter of pipe, necessary fittings.</p>					
5.	<p><b>Task:</b> Install Washbasin with Fittings</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Simulated work site and Necessary tools, Materials. Wash basin set.</p> <p><b>What:</b> Install Washbasin with Fittings.</p> <p><b>How well:</b></p>	Th. 1.0	Pr. 11.0	Tot. 12.0



		<ul style="list-style-type: none"> <li>• Wash basin must be placed horizontal alignment.</li> <li>• Height of the basin is 32".</li> <li>• Installation of wash basin must be free from leakage and have clear drainage.</li> </ul>			
	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect tools, material &amp; Drawing.</li> <li>2. Mark the area of basin, looking glass, shelf, soap case, trowel rail and liquid dispenser as per drawing and layout.</li> <li>3. Drill the marking points using drill machine.</li> <li>4. Put the rowel plug into the hole</li> <li>5. Fix the basin screw/nut into the hole.</li> <li>6. Fix basin waste and pillar cock with basin.</li> <li>7. Place washbasin with basin screw as per layout.</li> <li>8. Connect bottle trap with basin and waste line.</li> <li>9. Connect the angle stop cock with pillar cock.</li> <li>10. Level the installation area of wash basin using white cement.</li> <li>11. Place looking glass shelf over the basin using screw.</li> <li>12. Set mirror over the glass-shelf using screw.</li> <li>13. Fix soap case/liquid dispenser in the wall using screw</li> <li>14. Hang the towel rail in the wall using screw.</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• List the required tools &amp; materials.</li> <li>• Describe the different types of basin.</li> <li>• Explain the height of basin, soap case, towel rail, mirror and glass self.</li> <li>• Explain why to use bottle trap.</li> <li>• Explain the process to install wash basin.</li> <li>• Explain how to check leakage and correct drainage.</li> </ul>			

	<p>15. Conduct leakage test of wash basin and check the clear drainage.</p> <p>16. Clean the workplace</p> <p>17. Restore tools &amp; materials.</p>				
<p><b>Tools/equipment/materials required:</b> Measurement tape, Hacksaw frame, Drill machine, Hammer, Chisel, Slide wrench, Pipe wrench, Pliers, screw driver, Pillar cock, Angle stop cock, Basin, Soap case, Liquid soap case, Glass self, Mirror, Towel rail, Basin waste, Bottle trap, Pencil.</p>					
6.	<p><b>Task:</b> Install Pan with Fittings</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Necessary tools, Materials &amp; pan.</p> <p><b>What:</b> Install Pan with Fittings</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Cistern/low down with the bracket on the wall are placed using screw.</li> <li>• Long trap with clamp must be placed in ceiling</li> </ul>	Th. 1.0	Pr. 6.0	Tot. 7.0
<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect tools, material &amp; drawing.</li> <li>2. Mark the area as per layout.</li> <li>3. Cut the floor as per drawing using hammer and chisel.</li> <li>4. Adjust the pan on the floor with short pitch pipe as per layout.</li> <li>5. Place pan on the floor as per layout</li> <li>6. Place mortar around the pan.</li> <li>7. Fix the long trap with clamp.</li> <li>8. Connect the pan with soil line as per layout.</li> <li>9. Mark the area as per layout for low down.</li> </ol>		<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• List the required tools &amp; materials.</li> <li>• Explain to how to use long trap.</li> <li>• Describe the how to adjust of cistern.</li> <li>• Explain how to make a mortar.</li> <li>• Explain the steps to install pan.</li> <li>• Explain how to check the performance of pan.</li> </ul>			

	<p>10. Drill the marking points using drill machine.</p> <p>11. Put the rowel plug into the hole.</p> <p>12. Fix the bracket with wall using screw.</p> <p>13. Join the cistern/low down with the bracket on the wall using screw.</p> <p>14. Connect flash pipe with cistern and pan.</p> <p>15. Connect water pipeline with angle valve.</p> <p>16. Conduct leakage test and check the clear drainage.</p> <p>17. Clean the workplace.</p> <p>18. Restore tools &amp; materials.</p>				
<p><b>Tools/equipment/materials required:</b> Measurement tape, Hacksaw frame, Drill machine, Hammer, Chisel, Slide wrench, Pipe wrench, Pliers, screw driver, Angle stop cock, Long trap, Cistern, Pan, Flush pipe, Sprit level, Solution, Pencil. Cement, Sand, Bricks chips, Spade. Masonry tray, Trowel.</p>					
7.	<p><b>Task:</b> Install Sink with Fittings</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Necessary tools, Materials, Sink set.</p> <p><b>What:</b> Install sink with fittings</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Sink must be installed horizontal alignment.</li> <li>• Height of the sink is 32”.</li> <li>• Horizontal level must be checked by spirit level.</li> <li>• Water leakage test must be conducted.</li> </ul>	Th. 1.0	Pr. 7.0	Tot. 8.0
<p><b>Steps:</b></p> <p>1. Collect tools, material &amp; Drawing.</p>		<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• List the required tools &amp; materials.</li> <li>• Describe the different types of sink.</li> <li>• Explain how to use bottle trap.</li> </ul>			

	<ol style="list-style-type: none"> <li>2. Mark the installation area as per measurement and layout.</li> <li>3. Hole the wall using chisel and hammer.</li> <li>4. Fix the bracket on the wall with cement plaster.</li> <li>5. Join sink waste fitting with sink.</li> <li>6. Place sink with bracket.</li> <li>7. Connect bottle trap with sink and sink waste line.</li> <li>8. Connect the sink cock with water service line.</li> <li>9. Conduct leakage test and check the clear drainage.</li> <li>10. Clean the workplace.</li> <li>11. Restore tools &amp; materials.</li> </ol>	<ul style="list-style-type: none"> <li>• Explain the process to install sink.</li> <li>• Explain how to check the performance of sink.</li> </ul>			
<p><b>Tools/equipment/materials required:</b> Measurement tape, Hacksaw frame, Hammer, Chisel, Slide wrench, Screw driver, Pipe wrench, Pliers, Sink cock, Pencil, Sink waste, Sink Bottle trap, Sink, Thread tape.</p>					
8.	<p><b>Task:</b> Install Water Tap (bibcock/CP tap)</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Worksite, Necessary tools and Bibcock/CP tap.</p> <p><b>What:</b> Install Water Tap (bibcock/CP tap)</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Bibcock/CP tap must be installed in straight alignment.</li> <li>• Water leakage test must be checked through open/close the bibcock/CP tap.</li> </ul>	Th. 0.5	Pr. 3.5	Tot. 4.0
	<p><b>Steps:</b></p>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• List the required tools &amp; materials.</li> </ul>			

	<ol style="list-style-type: none"> <li>1. Collect tools, material and bibcock/CP.</li> <li>2. Open the plug from pipe top.</li> <li>3. Use thread tape in the threading area of bibcock/CP.</li> <li>4. Tighten bibcock/CP in clockwise by adjustable wrench.</li> <li>5. Conduct leakage test and correct drainage.</li> <li>6. Clean the workplace.</li> <li>7. Restore tools &amp; materials.</li> </ol>	<ul style="list-style-type: none"> <li>• Explain the functions of bibcock/CP</li> <li>• Explain how to use of bibcock/CP.</li> <li>• Explain the process to install bibcock/CP.</li> <li>• Explain how to check the performance of bibcock/CP.</li> </ul>			
<p><b>Tools/equipment/materials required:</b> Pipe wrench, Adjustable wrench, Measuring tape, Die-stock, Thread tape, Socket.</p>					
9.	<p><b>Task:</b> Install Water Pump</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Simulated work site and Necessary tools &amp; materials and water pump</p> <p><b>What:</b> Install Water Pump</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Water pump must be installed in horizontal alignment.</li> <li>• Inlet point of the water pump must be connected with the reserver and outlet point with the delivery pipeline.</li> </ul>	Th. 1.00	Pr. 6.0	Tot. 7.0
<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect tools, material &amp; drawing / Catalog.</li> <li>2. Mark positions on the floor as per drawing.</li> <li>3. Drill the marking points using drill machine</li> <li>4. Put the rowel bolt/fisher into the hole</li> </ol>		<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• List the required tools &amp; materials</li> <li>• Explain how to uses of water pump</li> <li>• Explain the functions of inlet and outlet points of water pump</li> <li>• Explain the process to install water pump</li> <li>• Explain how to check the performance of water pump.</li> </ul>			

	<ol style="list-style-type: none"> <li>5. Place the pump on the floor as per layout</li> <li>6. Put the bolt into the holing point</li> <li>7. Tighten the bolt in clock-wise direction properly</li> <li>8. Connect inlet point of pump motor with water reservoir using necessary fittings.</li> <li>9. Connect outlet point of water pump with the delivery pipe line of overhead tank.</li> <li>10. Fix non-return valve with the outlet of water pump</li> <li>11. Connect power cable of water pump with power supply line.</li> <li>12. Check the connection points and power supply line.</li> <li>13. Switch ON/OFF the power supply and check the performance</li> <li>14. Clean the workplace</li> <li>15. Restore tools &amp; materials</li> </ol>				
<p><b>Tools/equipment/materials required:</b> Hacksaw Frame, Measuring Tape, Pipe Wrench, Die-Stock, Adjustable Wrench, Oil Can, Hand Drill Machine, Hammer, Water Pump, Pipe, Thread Tape, Bend, Socket, Elbow, Union and Check Valve.</p>					
10.	<p><b>Task:</b> Install Water Tank</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Real work site and Necessary tools, Equipment &amp; materials.</p> <p><b>What:</b> Install Water Tank</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Service line must be connected with the inlet and outlet point of water tank.</li> </ul>	Th. 1.0	Pr. 6.0	Tot. 7.0

		<ul style="list-style-type: none"> <li>• Bend pipe must be connected with the outlet point to remove air.</li> <li>• Water leakage test must be checked through switch ON/OFF of gate valve of water tank</li> </ul>			
	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect tools, materials &amp; work drawing.</li> <li>2. Measure the length of inlet, outlet and overflow pipe.</li> <li>3. Cut inlet, outlet and overflow pipe according to the measurement using pipe cutter machine.</li> <li>4. Cut thread on inlet, outlet and overflow pipe using Die-stock</li> <li>5. Use thread tape in the threading area of inlet, outlet and overflow pipe</li> <li>6. Place tank jam-nut with inlet, outlet and overflow points of tank.</li> <li>7. Place the tank on the tank stand.</li> <li>8. Install necessary fittings (gate valve, union, nipple, T, elbow) with inlet, outlet and overflow pipe.</li> <li>9. Connect service line with the inlet point of water tank.</li> <li>10. Connect service line with the outlet point of water tank.</li> <li>11. Connect bend pipe with the outlet point of water tank as per drawing.</li> <li>12. Connect overflow line of tank with rain water pipe.</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• List the required tools &amp; materials</li> <li>• Explain how to uses of different types of fittings</li> <li>• Explain the functions of inlet and outlet points of water tank</li> <li>• Explain to uses of bent pipe and overflow pipe.</li> <li>• Explain the process to install water tank</li> <li>• Explain how to check the performance of water pump.</li> </ul>			

	<p>13. Check all the connection points of tank.</p> <p>14. Conduct leakage test and check the performance.</p> <p>15. Clean the workplace</p> <p>16. Restore tools &amp; materials</p>				
<p><b>Tools/equipment/materials required:</b> Measurement tape, Hammer, Chisel, Slide wrench, Pipe wrench, Pliers, Thread tape, Pipe, Elbow, T, Union, Gate valve, Nipple, Hexagon nut.</p>					
11.	<p><b>Task:</b> Install Stand Alone Shower</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Simulated work site and Necessary tools, Stand Alone Shower, Equipment &amp; materials.</p> <p><b>What:</b> Install Stand Alone Shower</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Height of the shower is 78".</li> <li>• Water leakage test must be checked through switch ON/OFF of conceal stock cock.</li> </ul>	Th. 0.5	Pr. 4.5	Tot. 5.0
<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect tools, equipment, material &amp; Drawing.</li> <li>2. Mark the wall as per measurement and drawing.</li> <li>3. Chase the wall using Grinding machine, chisel and hammer.</li> <li>4. Measure the pipe as per layout.</li> <li>5. Cut the pipe as per measurement</li> <li>6. Cut thread on the pipe as per measurement</li> </ol>		<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• List the required tools &amp; materials</li> <li>• Explain how to use the different types of shower</li> <li>• Explain the process to install shower</li> <li>• Explain how to check the performance of shower</li> </ul>			



	<ol style="list-style-type: none"> <li>7. Spire thread tape on the thread area of the pipe.</li> <li>8. Connect pipe with necessary fittings (conceal stock-cock, T, Elbow).</li> <li>9. Fix the pipe into the channel of the wall using nail.</li> <li>10. Connect shower with shower pipe line.</li> <li>11. Conduct leakage test and check the performance.</li> <li>12. Clean the workplace</li> <li>13. Restore tools &amp; materials</li> </ol>	
<p><b>Tools/equipment/materials required:</b> Measurement tape, Hammer, Chisel, Slide wrench, Pipe vice, Die-stock, Grinding Machine, Conceal stop cock, Bibcock, Moving shower, Pipe wrench, Pliers, Thread tape, Pipe, Elbow, T.</p>		

## Module 5: Repair & Maintenance of Plumbing Works

## 22.5. Module- 5: Repair & Maintenance of Plumbing Works

	<p><b>Description:</b> This module covers basic skills and knowledge about repair and maintenance of plumbing works. It provides skills to replace various valves including non-return valve, conceal valve, glove valve, pressure relief valve, socket valve, air valve, floating valve, foot valve, angle valve sluice valve, butterfly valve, ball valve, safety valve, check valve, gate valve, free blockage, leakage from pipe, repair water closet for commode, pan and repair minor masonry and plastering works</p>	Hours			
	<p><b>Module outcomes:</b> After completion of this module, trainees will be able to:</p> <ul style="list-style-type: none"> <li>• Replace valves from GI pipe</li> <li>• Replace valves from CPVC pipe</li> <li>• Remove blockage from pipe line</li> <li>• Repair water leakage of pipe line</li> <li>• Replace washer from pipe</li> <li>• Repair water closet for commode and pan</li> <li>• Repair and maintain minor masonry and plastering works</li> </ul>	<b>Th.</b> <b>4.0</b>	<b>Pr.</b> <b>26.0</b>	<b>Tot.</b> <b>30.0</b>	
1.	<p><b>Task:</b> Replace valves from GI pipe</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Tools, materials, equipment and working place.</p> <p><b>What:</b> Repair valves from GI pipe</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Thread of pipe must not be broken</li> <li>• Leakage test must be done through Switch OFF/ON the valve</li> </ul>	Th. 0.5	Pr. 4.0	Tot. 5.0
	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect required tools, materials.</li> <li>2. Close main water pipeline valve.</li> <li>3. Remove old valve using pipe wrench anticlockwise.</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• Explain the procedure of replacing valve from GI pipe</li> <li>• Explain the precautions while replacing valve.</li> </ul>			

	<ol style="list-style-type: none"> <li>4. Remove Teflon tape from the joint of pipe</li> <li>5. Clean the pipe with water.</li> <li>6. Spire the new Teflon tape clockwise on pipe</li> <li>7. Install new valve on the pipe</li> <li>8. Conduct leakage test and check the performance.</li> <li>9. Clean the workplace.</li> <li>10. Restore tools and materials.</li> </ol>				
		<b>Tools/equipment/materials required:</b> Galvanized Iron (GI) pipe, valves, pipe wrench, screw driver.			
2.	<b>Task:</b> Replace valves from uPVC/CPVC pipe	<b>Terminal Performance Objective (TPO):</b>  <b>Given:</b> Tools, equipment's and materials  <b>What:</b> Replace valves from uPVC/CPVC pipe  <b>How well:</b> <ul style="list-style-type: none"> <li>• Main water line must be closed before works</li> <li>• Leakage test must be done through Switch OFF/ON the valve</li> </ul>	Th. 0.5	Pr. 3.5	Tot. 4.0
<b>Steps:</b> <ol style="list-style-type: none"> <li>1. Collect required tools, materials.</li> <li>2. Close main water pipeline valve.</li> <li>3. Cut pipe from the both end of valve using pipe cutter.</li> <li>4. Cut a short piece of pipe according to the requirement.</li> <li>5. Apply primer on the short piece and main pipe</li> <li>6. Apply primer on the socket and new valve</li> </ol>		<b>Enabling objectives:</b> <ul style="list-style-type: none"> <li>• Explain the operation diestock.</li> <li>• Explain about clock wise and anti-clockwise direction.</li> </ul>			

	<ol style="list-style-type: none"> <li>7. Apply solvent cement on short piece, main pipe and socket and valve.</li> <li>8. Attach one side of valve with main pipe.</li> <li>9. Attach socket with other side of main pipe.</li> <li>10. Attach main pipe inside another end of valve.</li> <li>11. Conduct leakage test and have the clear drainage.</li> <li>12. Clean the workplace</li> <li>13. Restore the tools and materials.</li> </ol>				
<b>Tools/equipment/materials required:</b> uPVC/CPVC pipe, socket, pipe cutter, hand saw, primer, solvent cement, valve etc					
3.	<b>Task:</b> Remove blockage from pipe line	<b>Terminal Performance Objective (TPO):</b>  <b>Given:</b> Tools, equipment and materials  <b>What:</b> Remove blockage from pipe line  <b>How well:</b> <ul style="list-style-type: none"> <li>• Leakage test must be done through Switch OFF/ON the water line</li> </ul>	Th. 0.5	Pr. 3.0	Tot. 3.5
<b>Steps:</b> <ol style="list-style-type: none"> <li>1. Collect tools, equipment and materials</li> <li>2. Close main water pipeline valve.</li> <li>3. Remove the fitting from the main line using pipe wrench.</li> <li>4. Attach the compressor machine with the main pipe line.</li> <li>5. Switch ON the compressor machine and keep close the gate valve of compressor machine.</li> </ol>		<b>Enabling objectives:</b> <ul style="list-style-type: none"> <li>• List out the required tools, equipment and materials.</li> <li>• Explain the function of compressor machine.</li> <li>• Explain the procedure of repairing blockage from pipe line.</li> </ul>			

	<ol style="list-style-type: none"> <li>6. Switch OFF the compressor machine after two minutes.</li> <li>7. Open the gate valve of compressor machine.</li> <li>8. Open a bib cock to remove roust, clogs, debris etc</li> <li>9. Repeat step 4, 5, 6 until main line is fully unclogged.</li> <li>10. Fix the fitting with the main pipe line using pipe wrench.</li> <li>11. Conduct leakage test and have the clear drainage.</li> <li>12. Clean the work place.</li> <li>13. Restore tools, equipment and materials.</li> </ol>				
<b>Tools/equipment/materials required:</b> Compressor machine, pipe wrench, combination pliers, screw driver, bucket, Teflon tape etc					
4.	<b>Task:</b> Repair water leakage from GI pipe line	<b>Terminal Performance Objective (TPO):</b>  <b>Given:</b> Tools, equipment's and materials  <b>What:</b> Repair water leakage from GI pipe line  <b>How well:</b> <ul style="list-style-type: none"> <li>• Pipe line is repaired</li> <li>• No leakage in the pipe line</li> </ul>	Th. 0.5	Pr. 3.0	Tot. 3.5
<b>Steps:</b> <ol style="list-style-type: none"> <li>1. Collect tools, equipment and materials</li> <li>2. Close main water pipeline valve.</li> <li>3. Identify the leakage of the pipe area.</li> <li>4. Cut the wall or floor using chisel</li> <li>5. Cut and remove the leak/damage pipe.</li> <li>6. Select require size of pipe for replacement.</li> </ol>		<b>Enabling objectives:</b> <ul style="list-style-type: none"> <li>• Explain the technique of finding leakage area.</li> <li>• Explain the procedure of repairing leakage on GI pipe</li> </ul>			

	<ol style="list-style-type: none"> <li>7. Cut thread on pipe</li> <li>8. Apply Teflon tape on the tread</li> <li>9. Attach a union socket and short piece (nipple) with pipe.</li> <li>10. Tighten union socket on pipe.</li> <li>11. Apply plaster over chiseled area.</li> <li>12. Conduct leakage test and have the clear drainage.</li> <li>13. Clean work place.</li> <li>14. Restore all tool and materials.</li> </ol>				
<b>Tools/equipment/materials required:</b> Pipe wrench, hammer, chisel, die stock, pie vice, pipe cutter/hack saw, taflon tape, union socket, trowel, cement, water, sand etc.					
5.	<b>Task:</b> Repair water leakage from uPVC/CPVC pipe line	<b>Terminal Performance Objective (TPO):</b>  <b>Given:</b> Tools, equipment's and materials  <b>What:</b> Repair water leakage from uPVC/CPVC pipe line  <b>How well:</b> <ul style="list-style-type: none"> <li>• Pipe line is repaired</li> <li>• No leakage in the pipe line</li> <li>• Leakage test must be done and have clear drainage</li> </ul>	Th. 0.5	Pr. 3.0	Tot. 3.5
<b>Steps:</b> <ol style="list-style-type: none"> <li>1. Collect tools, equipment and materials</li> <li>2. Close main water pipeline valve.</li> <li>3. Identify the leak on the pipe area.</li> <li>4. Cut the wall or floor using chisel</li> <li>5. Cut and remove the leak/damage pipe.</li> <li>6. Select require size of pipe for replacement.</li> <li>7. Apply primer on socket, main pipe and socket</li> </ol>		<b>Enabling objectives:</b> <ul style="list-style-type: none"> <li>• Explain the technique of finding leakage area.</li> <li>• Explain the procedure of repairing leakage on GI pipe</li> </ul>			

	8. Apply solvent cement on socket, main pipe and socket. 9. Fix main pipe, socket and short piece. 10. Conduct leakage test. 11. Apply plaster over chiseled area. 12. Clean work place. 13. Restore all tool and materials.				
<b>Tools/equipment/materials required:</b> Hammer, chisel, pipe cutter/hack saw, primer, socket, short piece, solvent cement, trowel, cement, water, sand etc.					
6.	<b>Task:</b> Replace Water Closet for Commode and Pan	<b>Terminal Performance Objective (TPO):</b>  <b>Given:</b> Worksite, simulated workplace, tools, and materials  <b>What:</b> Repair water closet for commode and pan  <b>How well:</b> <ul style="list-style-type: none"> <li>Commode/pan is replaced</li> </ul>	Th. 0.5	Pr. 4.0	Tot. 4.5
	<b>Steps:</b> 1. Collect tools, equipment and materials 2. Close main water pipeline valve. 3. Disconnect flush pipe/angle stop cock. 4. Remove commode/pan from trap. 5. Clean the floor where the commode/pan is to be rested 6. Fix commode/pan with trap 7. Conduct leakage test 8. Clean the workplace. 9. Restore all tools and materials.	<b>Enabling objectives:</b> <ul style="list-style-type: none"> <li>List out the name of parts of water closet</li> <li>Explain the procedure of replacing water closet</li> </ul>			
<b>Tools/equipment/materials required:</b> Hammer, chisel, glue, commode/pan, cement, sand, water, trowel etc.					
7.	<b>Task:</b> Repair Low Down	<b>Terminal Performance Objective (TPO):</b>	Th. 0.5	Pr. 3.0	Tot. 3.5



		<p><b>Given:</b> Real work site and Low down of commode or pan, adjustable wrench, pliers, pipe wrench and screw driver.</p> <p><b>What:</b> Repair Low Down</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• The angle stop cock must be switched OFF before work</li> <li>• Connection pipe from the angle stop cock must be separated</li> <li>• Switch ON/OFF the angle stop cock during leakage test</li> <li>• Leakage test must be done and have clear drainage</li> </ul>			
	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect tools and materials.</li> <li>2. Switch OFF the angle stop cock</li> <li>3. Separate the connection pipe from the angle stop cock</li> <li>4. Pull out the syphon from lowdown</li> <li>5. Replace new syphon with the lowdown</li> <li>6. Connect the connection pipe with the angle stop cock</li> <li>7. Conduct leakage test.</li> <li>8. Clean the workplace</li> <li>9. Restore tools &amp; materials</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• List the required tools &amp; materials</li> <li>• Describe why angle stop cock needs to be switched OFF</li> <li>• Explain how to replace syphon of lowdown</li> <li>• Explain the process to repair the low down of commode and pan</li> </ul>			
<p><b>Tools/equipment/materials required:</b> Adjustable wrench, pliers, pipe wrench, screw driver and low down syphon</p>					
<p><b>8.</b></p>	<p><b>Task:</b> Repair and Maintain Minor Masonry and Plastering Works</p>	<p><b>Terminal Performance Objective (TPO):</b></p> <p><b>Given:</b> Real work site and materials.</p>	<p>Th. 0.5</p>	<p>Pr. 2.5</p>	<p>Tot. 3.0</p>

		<p><b>What:</b> Repair and Maintain Minor Masonry and Plastering Works</p> <p><b>How well:</b></p> <ul style="list-style-type: none"> <li>• Plaster must be uniform in repairing area</li> </ul>			
	<p><b>Steps:</b></p> <ol style="list-style-type: none"> <li>1. Collect tools, materials (cement and sand) &amp; drawing.</li> <li>2. Mix cement and sand following the mixture ratio</li> <li>3. Identify the repairing area</li> <li>4. Repair and replace the fittings and accessories</li> <li>5. Plaster the repairing area</li> <li>6. Clean the workplace</li> <li>7. Restore tools &amp; materials</li> </ol>	<p><b>Enabling objectives:</b></p> <ul style="list-style-type: none"> <li>• List the required tools &amp; materials</li> <li>• Explain how to mix cement and sand</li> </ul>			
<p><b>Tools/equipment/materials required:</b> Cements, Sand, Trowel, Hammer, Chisel</p>					

### 23. LIST OF TOOLS, EQUIPMENT AND MATERIALS:

#### LIST OF TOOLS AND EQUIPMENT:

SI No	Name of the items	Specification	QTY.	Unit
1.	Flat Screw Driver	8"-12"	20	Pcs
2.	Star Screw Driver	8"-12"	20	Pcs
3.	Combination Pliers	8"	20	Pcs
4.	Cutting Pliers	8"	20	Pcs
5.	Nose Pliers	8"	20	Pcs
6.	Hacksaw	steel body	20	Pcs
7.	Mini hacksaw	steel body	20	Pcs
8.	Ball Pin Hammer	1 lbs	20	Pcs
9.	Ball Pin Hammer	1/2 lbs	20	Pcs
10.	Claw Hammer	1lbs	20	Pcs
11.	Flat Chisel	8"-10"	20	Pcs
12.	Measuring Tape	3m/5m, Steel	20	Pcs
13.	Hand Drill Machine	12"	20	Pcs
14.	Power Grinding Machine	800-1000W, 250VAC	20	Pcs
15.	Power Drill Machine(Hammer type)	800W, 250VAC,	20	Pcs
16.	Cutting Disks	4"	20	Pcs
17.	Adjustable Wrench	8"-12"	20	Pcs
18.	Scissor	10" Steel	20	Pcs
19.	File	Flat Type, 10"	20	Pcs
20.	File	Half Round, 10"	20	Pcs
21.	Die- stock	½"-2"	20	Pcs
22.	Pipe vice	½"-2"	05	
23.	Bench vice	6"jaw	05	
24.	Plumb bob	Brush 100gm	05	
25.	Pipe wrench	18", 20", 22"	20	Pcs
26.	Sprit level	12"	20	Pcs
27.	Pipe reamer		20	Pcs
28.	Try square	12"	20	Pcs
29.	Spanner set		20	Pcs

SI No	Name of the items	Specification	QTY.	Unit
30.	Oil cane	½ liter	20	Pcs
31.	Monkey wrench		20	Pcs
32.	Center punch		02	
33.	Number punch		02	
34.	Scriver		20	Pcs
35.	Brick hammer		20	Pcs
36.	Pipe cutter	½"-2"	20	Pcs
37.	Blow lamp		20	Pcs
38.	Compressor machine		20	Pcs
39.	Welding device (PPR)		05	Pcs
40.	Water pump	1Hp	05	Pcs
41.	Trowel		20	Pcs

**LIST OF TRAINING MATERIALS:**

SI No	Name of the items	Specification	QTY.	Unit
1.	G.I Socket	½"-2"	20	Pcs
2.	G.I Nipple	½"-2"	20	Pcs
3.	G.I Elbow	½"-2"	20	Pcs
4.	G.I Union	½"-2"	20	Pcs
5.	G.I Tee	½"-2"	20	Pcs
6.	G.I Reducer	½"-2"	20	Pcs
7.	G.I Cross	½"-2"	20	Pcs
8.	Gate valve	½"-2"	20	Pcs
9.	Angle Stop cock	½"	20	Pcs
10.	Bibcock	½"	20	Pcs
11.	Plug and Cap	½"-2"	20	Pcs
12.	G.I Pipes	½"-2"	20	Pcs
13.	Thread tape	½"	20	Pcs
14.	Mobil Oil	Liter	20	liter
15.	Check valve	½"-2"	20	Pcs
16.	uPVC Pipe	½"-2"	20	Pcs

SI No	Name of the items	Specification	QTY.	Unit
17.	Commode/pan	Standard	20	Pcs
18.	Shower	3" - 6"	20	Pcs
19.	Sink set	Standard	20	Pcs
20.	Flush tank fittings	Standard	20	Pcs
21.	Tank fittings	½" -2"	05	Pcs
22.	Cement	Standard	50	kg
23.	Sand	Standard	20	Bag
24.	Solvent cement	400 gm/Tin	20	Pck
25.	Bottle Trap	Standard	20	Pcs
26.	Water tank	1000 liter	05	Pcs
27.	Mixture Trap	½" -¾"	20	Pcs
28.	Basin set	Standard	20	Pcs
29.	Brick chips	Standard	10	Bag
30.	Sink set	Standard	20	Pcs

#### 24. PHYSICAL FACILITIES FOR 20 TRAINEES:

SI No	Name of the items	Specification	QTY.	Unit
1.	Working Place/Practical Room	40' X 30'	1	Room
2.	Stool	Plastic (RFL)	20	Pcs
3.	Training wall	20' X 7'	2	Pcs
4.	Instructor Chair Arm Less (Gorjon Wood)	Size: 18" X 16" X 36"	2	Pcs
5.	Working Table (Gorjon Wood)	Size: 8' X 3' X 3'	5	Pcs
6.	Class Room Table (Gorjon Wood)	Size: 24" X 30" X 36"	1	Pcs
7.	Display Board	4' X8' X3/4", Surface Cover With White Formica, Border bracing with 3/4 " Aluminum Angle	1	Pcs
8.	White Board	6'X4'X3/4" Surface Cover With White Formica, Border bracing with 3/4 " Aluminum Angle	1	Pcs
9.	Steel Rack	44" X 72" X 15" 20-22 SWG	2	Pcs

SI No	Name of the items	Specification	QTY.	Unit
10.	First Aid Box with accessories		1	
11.	Steel Almirah	Standard Size , 20-22 SWG	2	Pcs
12.	White Board Marker	Red leaf	5	Doz
13.	Water Filter	40 Ltr	1	Pcs
14.	Safety Goggles	Plastic (Transparent )	20	Pcs
15.	Hand Gloves	Skin/ruber type	20	Pair
16.	Safety Shoes	APS	20	Pair
17.	Helmet	Plastic	20	Pcs
18.	Fire extinguisher	ABC	2	cylinder

#### 25. LIST OF TOOLS IN THE HAND TOOL BOX:

SI No	Name of the items	Specification	QTY.	Unit
1.	Flat Chisel	10"- 12"	1	pcs
2.	Slide Wrench	8"- 12"	1	pcs
3.	Cutting Pliers	8 inches	1	Pc
4.	Long Nose Pliers	8 inches	1	Pc
5.	Star Screw Driver	8 inches	1	Pc
6.	Flat Screw Driver	8 inches	1	Pc
7.	Ball Pin Hammer	½ Pound	1	Pc
8.	Junior Hack Saw frame with Blade	8 inches	1	Pc
9.	Pipe Wrench	14"-24"	2	pcs
10.	Steel Measuring Tape	5 meters	1	Pc
11.	Lock with Keys	3"	1	Pc

#### 26. SUGGESTED REFERENCE BOOKS:

- Internet Browse
- Plumbing Design and Practice written by SG Deolalikar
- Plumbing written by Steve Microsoft

## 27. CURRICULUM TERMS AND DEFINITION:

<b>Competency</b>	Competency means a cluster of related abilities, commitments, knowledge, and skills that enable a trainees or person to act effectively in a job.
<b>Curriculum Guide</b>	A curriculum guide is a detail resource for trainers/instructors to conduct training programs effectively. The guide intends to add the trainers/instructors in developing lesson plan, handouts/learning materials, training manuals, and evaluation criteria etc, which are basic elements in the teaching learning process.
<b>Curriculum</b>	A plan for providing sets of learning opportunity to achieve broad goal and related specific objectives for the people by a single school center.
<b>DACUM/RJA</b>	Developing A Curriculum / Rapid Job Analysis. DACUM/RJA is a technique that is used to identify the competencies relevant to a particular occupation. Then the competencies of the DACUM/RJA have been formulated in details to build a curriculum guideline
<b>Duty</b>	Duty is an arbitrary clustering of related tasks in to broad functional area or general area of responsibility of trainees.
<b>Enabling Objective</b>	A statement expressing a knowledge, skills or attitudes those will enable the trainee to accomplish a terminal performance objective.
<b>Instructional Guide</b>	Instructional guide is a well-planned and structured document for the instructor to deliver effective instruction so that trainees can attain learning objectives as per training standards.
<b>Module</b>	A module is defined as a specific learning material. Modules are essentially self-contained. Self-instructional packages, with learning paced by each learner according to his/her individual ability and needs. A module covers either a single element of subject matter content or a group of content elements forming a discrete unit of subject matter or area of skills.
<b>Occupational Analysis</b>	Occupational analysis is a process used to identify the duties and tasks those are important to workers in any given occupation. A number of alternative and acceptable approaches to occupational analysis are available.
<b>Program guide</b>	A program guide is a comprehensive resource for trainers/instructors, planners, and top-level management for planning and implementation of any training programs.
<b>Program Objectives</b>	The objectives are set in a broad way to target to achieve mastery learning of the complete occupation.
<b>Skill</b>	The ability to perform on occupational task with the degree of proficiency required for a given occupation
<b>Step</b>	The smallest discrete or observable aspect of a task.
<b>Task Analysis</b>	Task analysis is the process of identifying and writing down the specific skills, knowledge and attitudes that distinguish someone who performs a task competently from someone who cannot perform the task at all.
<b>Task</b>	A unit of work complete in itself that forms a logical part of on occupation. It can be broken down into discrete steps.
<b>Terminal Performance Objective</b>	The objectives set to attain at the end of the training completion. It includes condition, unit of work and standard of teaching and learning.

**28. CURRICULUM DEVELOPMENT TEAM:**

SL #	Name	Designation	Organization	Contact Number
1.	Bikash Chandra Saha	Senior Instructor	UCEP-Bangladesh	01717-308084
2.	Jahid Hasan (Jahid)	Plumber (Foreman)	Alauddin and Brothers	01782-381614
3.	Md. Alfaz Hossain	Instructor	Montage Training and Certification Bangladesh	01732-053683
4.	Md. Manzur Ahmed	Site Engineer	Noor view Properties Ltd.	01914-806129
5.	Md. Sayeed salman	Plumber (Foreman)	Alauddin and Brothers	01717-359498
6.	Md. Amir Hossain (Razib)	Instructor	Dhaka Ahsania Mission (DAM)	01677-478616
7.	Md. Iftakharul Alam khan	Project Officer	SEP-B	
8.	Belayet Hossain	Training Coordinator	SEP-B	01713-034145
9.	Simon Coetzee	Consultant	SEP-B (Curriculum Design Africa)	01706-271675
10.	Md. Anisuzzaman	Training Coordinator	SEP-B	01912-153859
11.	Mohammad Zulfikar Ali	Secretary	BACI	01911-425077

**Overall Supervision:** Md. Anisuzzaman and Simon Coetzee

**Record and Documentation:** Md. Anisuzzaman and Simon Coetzee

**29. REFERENCES:**

- Bangladesh Technical Education Board. *National Competency Standards for Plumbing*. National Skills Certificate Level-1, 2 & 3 (Civil Construction)
- Technical Institute for Technical Instruction (TITI), Nepal
- Contents of curriculum of UCEP



**30. LINKAGES OF SEP-B CURRICULUM WITH BTEB COMPETENCY STANDARDS:**

S.N.	SEP-B Training Module	BTEB Competency Standards
1.	Practice Occupational Health and Safety (OHS) Procedure	GN100412A: Practice occupational health and safety (OHS) procedures
2.	Fundamental Works of Plumbing and Pipe Fitting	CON100212A: Interpret Drawings and Specifications in Plumbing Manuals CON100312A: Use Hand Tools and Power Tools for Plumbing CON100412A: Perform Measurement and Calculations in Plumbing CON100512A: Maintain tools and equipment
3.	Perform Basic Plumbing and Pipe Fitting Work	CONPLM100112A: Fabricate Pipes CONPLM100212A: Prepare Pipes for Installation CONPLM100312A: Make Pipe Joints and connections CONPLM100412A: Perform Cutting and Penetration for plumbing works
4.	Installation of Fittings and Fixtures in Plumbing Works	CONPLM200512A: Install water supply pipe with fittings CONPLM200612A: Install waste water pipe with fittings CONPLM200712A: Install plumbing fixtures CONPLM200812A: Conduct pipe leakage testing CONPLM301012A: Perform plumbing Layout CONPLM301112A: Perform plumbing fixture installation and assemblies CONPLM101212A: Install hot and potable chilled water piping system
5.	Repair & Maintenance of Plumbing Works	CONPLM200912A: Repair and maintenance work for plumbing

**31. SPECIAL NOTE FOR TRAINING PROVIDERS:**

Since the technology is moving fast, if there will have any new demand/skills beyond the curriculum guide, please send the comments and suggestions to the address given in the curriculum. The project believes that the development has no boundaries.

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