

**SYLLABUS OF SEMESTER SYSTEM**

**FOR THE TRADE OF**

# **PLUMBER**

**Under**

**Craftsmen Training Scheme (CTS)**

**(One year/Two Semesters)**

**Redesigned in**

**2014**

**By**

**Government of India**

**Ministry of Labour & Employment (DGE&T)**

# **FORMAT FOR CTS**

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**3. General Information**

**4. Week wise contents of TT and TP (In tabular form)**

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**7. Tools and Equipments list - broad specification**

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# GENERAL INFORMATION

<b>1. Name of the Trade</b>	<b>PLUMBER (Engineering Trade)</b>
<b>2. N.C.O. Code No.</b>	<b>NCO-2004/7136.10</b>
<b>3. Qualification Pack Code No.</b>	<b>PSC/Q0110</b>
<b>4. Duration of Training</b>	<b>Twelve months (Two semesters of six Months each)</b>
<b>5. Entry Qualification</b>	<b>10<sup>th</sup> Passed or failed</b>
<b>6. Unit Strength</b>	<b>20 Trainees (Two Batches-each batch of 20 Trainees)</b>
<b>7. Space Norms</b>	<b>a) Class room: 30 sqm. b) Workshop: 80 sqm.</b>
<b>8. Power Norms</b>	<b>a) Class room: 1kw (6000 lumen) b) Workshop : 2 kw (30,000 lumen)</b>
<b>9. Job Role :</b> <b>At the end of course the trainee will be able to:-</b> <ul style="list-style-type: none"> <li>• Installation &amp; repair plumbing systems including those of advanced sanitary fixtures as per Manufacture's specification in housing, commercial and industrial setup.</li> </ul>	
<b>10. Instructor's Qualification</b>	<b>Training officer/Instructor – 2 no's Workshop attendant – 1 no</b>
<b>11. Instructor's/Trainer's Qualification</b>	<b>Academic Qualification:</b> <b>(a)Passed10th</b> class under 10+2 system with Science and Mathematics <b>(b) Technical Qualification:</b> <ul style="list-style-type: none"> <li>• Degree or Diploma in Civil / Mechanical branch of engineering with 1 or 2 years post qualification experience respectively.</li> </ul> OR <ul style="list-style-type: none"> <li>• NTC in same or relevant trade with 4 years' post qualification experience.</li> </ul> OR <ul style="list-style-type: none"> <li>• NAC in same or relevant trade with 3 years' post qualification experience.</li> </ul> <b>(c)Desirable Qualification:</b> Passed National Craft Instructor Training course in same OR relevant trade.

## Syllabus for the Trade of Plumber under CTS

**First Semester (Semester Code No. –PLR: SEM-I)**

**Duration: Six Months**

### Syllabus for TP 01 and TT 01

#### Week wise content Index of First Semester

Sl. No.	Week No.	Contents Heading		Duration
		Practical	Theory	
1.	1.	Familiarization with Institute	Importance of the trade.	1 week
2.	2,3	Use of Fitter's hand tools	Fitter's hand tools	2 week
3.	4, 5 & 6	Marking, filing, drilling holes and sawing.	Types of files, pipes.	3 week
4.	7,8	uses of Carpenter's hand tools	Description of Carpenter's hand tools	2 week
5.	9, 10 & 11	Practice of gas welding	Gas welding	3week
6.	12, 13 & 14	Use of mason hand tools	Mason hand tools	3 week
7.	15, 16 & 17	Use and care of the plumber's tools and equipments.	Descriptions of the plumber's tools and equipments.	3 week
8.	18	Water distribution system	Composition of Water	1 week
9.	19	PVC welding	Hot gas welding,Electric heat welding	1 week
10.	20	Fixing of different pipe accessories	Description of water fittings.	1 week
11.	21	Use & fixing of P.V.C. pipe fittings	Types of traps	1 week
12.	22,23	<b>Project work / Site Visit</b>		2 weeks
13.	24	<b>Revision</b>		1 week
14.	25,26	<b>Examination</b>		2 weeks

## Syllabus for the Trade of Plumber under CTS

First Semester (Semester Code No. –PLR: SEM-I)

Duration: Six Months

### Syllabus for Workshop Calculation and Science

#### Week wise content Index of First Semester

Sl. No.	Week No.	Workshop Calculation and Science	Duration
1.	2,5	Applied workshop problems involving multiplication and division, system of units	4 week
2.	6,7	Properties of materials & uses	2 week
3.	8	Applied workshop problems on fraction & decimal	1 week
4.	9,10	Metric measurements	2 week
5.	11,12	Square root of a whole number and a decimal	2 week
6.	13	Shop problem on unit of weight	1 week
7.	14,15	Shop problem on percentage	2 week
8.	16,17	Applied workshop problems on work, power & energy	2 week
9.	18	Problem on friction	1 week
10.	19	Centre of Gravity	1 week
11.	20,21	Mensuration	2 week
12.	22 to26	Revision & Examination	

## Syllabus for the Trade of Plumber under CTS

**First Semester (Semester Code No. –PLR:SEM-I)**

**Duration: Six Months**

### Syllabus for Engineering Drawing

#### Week wise content Index of First Semester

Sl. No.	Week No.	Engineering Drawing	Duration
1.	2,4	Free hand sketching	3 week
2.	5	Reading of drawing	1 week
3.	6	Use of drawing instruments	1 week
4.	7	Sketching of views of simple bodies	1 week
5.	8,9	Orthographic projection in first angle	2 week
6.	10 to 14	Orthographic projection in third angle	5 week
7.	15 to 18	View of simple hollow & solid bodies	4 week
8.	19, 20	Isometric view of simple bodies	2 week
9.	21	Conversion of orthographic views	1 week
10	22 to 26	Revision & Examination	

## Syllabus for the Trade of Plumber under CTS

Second Semester (Semester Code No. –PLR:SEM-II)

Duration: Six Months

### Syllabus for TP 02 and TT 02

#### Week wise content Index of Second Semester

Sl. No.	Week No	Contents Heading		Duration
		Practical	Theory	
1.	1	Laying out of hummed and asbestos pipes	Method of laying out pipes alignment and joining.	1 week
2.	2	Joining of pipes	Description of various pipe joints	1 week
3.	3,4	Installation of electric pumps	Description of Plumber's materials	2 week
4.	5	Repair of hand water pumps	Description and types of pumps	1 week
5.	6,7	practice on cutting threads (internal and external)	Description of pipe dies, their uses, care and precaution.	2 week
6.	8	Bending and shaping of different pipes	Bending machine and method of bending.	1 week
7.	9	Practice on wiping lead pipe joints.	Method of bending pipes by hot and cold process	1 week
8.	10	Tracing out leakages and repairing of water supply system.	Air lock in pipes and its removal.	1 week
9.	11	Practice on fixing of different water, gas and steam cocks and valves,	Description of cocks & valves-their types,materials.	1 week
10.	12,13&14	Erecting simple water supply system	inspection and testing of water supply system.	3 week
11.	15	Joining practice on lead pipe.	Type of joints used for different materials	1 week
12.	16	Bending of galvanized pipe	Method of bending Galvanized pipe	1 week
13.	17,18	Measurement, preparation and fixing up of lead wastes from wash basin and bath.	<b>Domestic drainage system</b>	2 week
14.	19	Measurement, cutting, preparation and fixing up of rising mains and distributing pipes	Concept of heat and temperature.	1 week
15.	20	Repairing of waste outlet	General layout, specification of materials required and	1 week

			connection of pipes to mains.	
16.	21	Repairing of broken or cracked sanitary fittings.	Sensor system for urinals and was basin,	1 week
17	22,23	<b>Project work / site visit</b>		2 weeks
18	24	<b>Revision</b>		1 week
19	25,26	<b>Exam</b>		2 weeks



## Syllabus for the Trade of Plumber under CTS

Second Semester (Semester Code No. –PLR:SEM-II)

Duration: Six Months

### Syllabus for Workshop Calculation and Science

#### Week wise content Index of Second Semester

Sl. No.	Week No.	Workshop Calculation and Science	Duration
1.	1.	Shop problems on calculation of area, volume & weight of solid bodies.	1 week
2.	2,3& 4	Heat & Temperature	4 week
3.	5, 6 & 7	Workshop problems on determination of volume & weight	3 week
4.	8	Geometrical properties of plain figures.	1 week
5.	9	Estimation of material for different job	1 week
6.	10	Determination of pipe length	1 week
7.	11 to 14	Calculation of volume and weight of water in container	4 week
8.	15	Electricity and its uses	1 week
9.	16	Reading of simple graphs	1 week
10.	17 to 19	Work, Power & Energy	3 week
11.	20,21	Estimation for material required for installation	2 week
12	22 to 26	Revision & Examination	

## Syllabus for the Trade of Plumber under CTS

Second Semester (Semester Code No. –PLR:SEM-II)

Duration: Six Months

### Syllabus for Engineering Drawing

#### Week wise content Index of Second Semester

Sl. No.	Week No.	Engineering Drawing	Duration
1.	1.	Construction of simple figures & types of scales.	1 week
2.	2	Lettering-Number & Alphabets	1 week
3.	3 to 7	Freehand sketching in isometric of simple objects	5 week
4.	8, 9	Drawing a plan & elevation of different types of bar	2 week
5.	10	Preparing layout plan for showing the water line for village & town.	1 week
6.	11	Exercises for practices	1 week
7.	12 to 16	Studying of building plan for marking the position of the sanitary fittings	5 week
8.	17 to 19	Preparation of simple working drawing	3 week
9.	20, 21	Drawing a longitudinal section of the house drain	2 week
10.	22 to 26	Revision & Examination	1 week

## Syllabus for the Trade of Plumber under CTS

First Semester (Semester Code No. –PLR:SEM-I)

Duration: Six Months

### Syllabus for TP 01 and TT 01

## Syllabus for the Trade of Plumber under CTS

Week No.	Trade Practical	Trade Theory
1.	<p><b>INDUCTION TRAINING:</b></p> <ul style="list-style-type: none"> <li>• Familiarization with the institute.</li> <li>• Importance of trade training. -Machinery used in the type of work done by trainees in the institute.</li> <li>• Type of jobs made by the trainees in the trade.</li> <li>• Introduction to safety: Equipment including fire fighting and their uses.</li> </ul>	<ul style="list-style-type: none"> <li>• Importance of safety and general precautions required for the trade.</li> <li>• Importance of the trade.</li> <li>• Types of work to be done by trainees in the institute.</li> <li>• scope of a plumbing work.</li> <li>• Types of services has to plan.</li> <li>• Basic Bench fitting</li> </ul>
2,3	<ul style="list-style-type: none"> <li>• Use of steel rules, engineers square, Scriber and dividers for marking out from drawing.</li> <li>• Technique of handling properly the various Fitter’s hand tools: hacksaw, centre punch, chisels, hammer, calipers, different files, bench vice and hand vice , taps ,dies and holders.</li> </ul>	<ul style="list-style-type: none"> <li>• Fitter’s common hand tools - names, description and material from which they are made.</li> <li>• Description, types and uses of :holding device , hammers &amp; cold chisels, cutting tools</li> </ul>
4, 5 & 6	<ul style="list-style-type: none"> <li>• Use of hacksaw, centre punch, Marking, filing, drilling holes and sawing.</li> <li>• Marking for drilling holes Drilling, tapping and threading on pipes.</li> <li>• Making of studs and bolts.</li> <li>• Different types of Files &amp; filing to line.</li> <li>• Filing a job flat and square.</li> <li>• Use of various locking devices. Fastening devices</li> <li>• fixing of mating pairs, check nut, locking pins.</li> <li>• Practicing chipping operation,</li> </ul>	<ul style="list-style-type: none"> <li>• Description of simple fitting operations hack sawing, punching and filing.</li> <li>• Types of files used commonly.</li> <li>• Marking instruments and their use.</li> <li>• Description of simple drilling machine.</li> <li>• Method of using drills, taps and dies.</li> <li>• Description of simple bench drilling Machine.</li> <li>• Description of different types of locking and fastening devices.</li> <li>• Different types of pipes-</li> </ul>

	<p>Grinding of chisels. Cold chisel, round nose chisel.</p> <ul style="list-style-type: none"> <li>• Drilling and tapping, dieing, making internal and external threads.</li> <li>• Threading pipe of various sizes.</li> <li>• Fixing of different fittings.</li> </ul>	<p>GI,CI,PVC/CPVC,PPR,AC and HDPE etc.</p>
7,8	<ul style="list-style-type: none"> <li>• Demonstration and uses of Carpenter's hand tools involving sawing, planning, chiseling and making simple joints.</li> </ul>	<ul style="list-style-type: none"> <li>• Description and uses of Carpenter's hand tools used for simple operations such as marking, sawing, planning and making simple joints.</li> <li>• Common types of wood- their description and use.</li> </ul>
9, 10 & 11	<p><b>Practice of gas welding:</b></p> <ul style="list-style-type: none"> <li>• Joining of pipes of different diameters and thickness by welding.</li> <li>• Simple repair work by welding. Practice in soldering and brazing of simple jobs.</li> </ul>	<p><b>Gas welding :</b></p> <ul style="list-style-type: none"> <li>• Gas purpose</li> <li>• Method of gas welding,</li> <li>• Safety precautions to be observed -Methods of soldering and brazing –fluxes used &amp; Types of fluxes</li> <li>• precautions to be observed.</li> <li>• Hard &amp; soft solders –their properties, composition and uses.</li> </ul>
12, 13 & 14	<ul style="list-style-type: none"> <li>• Use of mason hand tools : Straight edge spirit level, plumb bob, square, etc.</li> <li>• Setting out work with tape, rule, square, line pin, and level. Cutting bricks and stones to given size and template.</li> <li>• Preparation of lime &amp; cement mortars in different proportions to suit various purposes.</li> <li>• Elementary brick work such as construction of gulley trap, inspection chamber &amp; manhole of any convenient size.</li> <li>• Forming, benching and channeling and plastering the walls.</li> <li>• cutting of wall with Masonry electric cutting tools.</li> </ul>	<p><b>Masons hand tools:</b></p> <ul style="list-style-type: none"> <li>• Names, description and their uses. -Method of making holes in walls and floors.</li> <li>• Types of tools used and various Processes.</li> <li>• Concept of bricks, lime and cement.</li> <li>• Preparation of mortars with various materials of varying composition.</li> <li>• Common brick joints.</li> <li>• Description of bonds.</li> <li>• Scaffolding &amp; plastering.</li> <li>• Method of construction of manhole etc.</li> <li>• Plain cement concrete, RCC and its proportion,</li> <li>• grades of coarse aggregate and fine aggregate,</li> <li>• Defin eplain concrete with cement mortar and lime</li> </ul>

		<p>mortar.</p> <ul style="list-style-type: none"> <li>● Knowledge of waterproofing compound</li> </ul>
15, 16 & 17	<ul style="list-style-type: none"> <li>● Use and care of the plumber's tools and equipments.</li> <li>● Cutting of pipes of different metals of different dimensions and sizes.</li> <li>● Bending of copper tubes of light gauges.</li> <li>● Bending of mild steel pipes and tubes and PVC pipes</li> <li>● Bending method:</li> <li>● Practice on cutting pipe at different angles for different joints.</li> <li>● Bending of heavy weight mild Steel and galvanized pipes up to 50 mm dia.</li> </ul>	<ul style="list-style-type: none"> <li>● Identify plumbing services required for each type of building according to usage.</li> <li>● Description of plumber tools and Equipments-ratchet, brace, threading die, pipe wrench, sliding wrench, spanner set, chain Wrench etc. and their safety.</li> <li>● Plumbing Symbols.</li> <li>● Care &amp; use of tools.</li> <li>● <b>Pipes</b> different kinds.</li> <li>● <b>Pipe fitting</b> –bends, elbows, sockets, tees, unions etc.</li> <li>● their description, specification and use.</li> </ul>
18	<ul style="list-style-type: none"> <li>● Water distribution system.</li> <li>● Fixing of floor traps in kitchen and bath.</li> <li>● steps of simple pipe connection</li> </ul>	<p><b>Composition of water:</b></p> <ul style="list-style-type: none"> <li>● Hard &amp; Soft water, temporary hardness &amp; permanent hardness. -Action of water on lead-water softness –tests for water – static water pressures and</li> <li>● measurement of pressures. Bursting pressure,</li> <li>● Expansion of water on freezing and heating.</li> <li>● Bernoulli's principles</li> <li>● Pascal's law</li> <li>● pressure of water on the sides of cistern or tank.</li> <li>● water hammer in pipes.</li> </ul>
19	<ul style="list-style-type: none"> <li>● PVC welding</li> <li>● PPR pipe welding joint</li> </ul>	<ul style="list-style-type: none"> <li>● Equipments and tools for hot gas welding and electric hot plate for PPR pipe joints</li> </ul>
20	<ul style="list-style-type: none"> <li>● Fixing of different pipe accessories such as bends, flanges, tees, elbows, sockets, cocks and valves.</li> <li>● Making of simple joints for different purposes using above.</li> <li>● Socket joint of cast iron pipes with lead</li> </ul>	<ul style="list-style-type: none"> <li>● Types of fittings for different joints &amp; different pipes.</li> <li>● Description of pipe fittings.</li> <li>● Methods of joining and their uses.</li> <li>● Precautions to be taken while fixing.</li> </ul>

21	<ul style="list-style-type: none"> <li>• Practice on cutting &amp; shaping P.V.C .pipes to sizes.</li> <li>• Use &amp; fixing of P.V.C. pipe fittings</li> <li>• Preparation of P.V.C. pipe joints.</li> <li>• Layout of P.V.C. pipe according to drawing.</li> <li>• P.V.C. Description, Properties &amp; use in plumbing work. Method of cutting &amp; preparing joints.</li> <li>• P.V.C. fittings their description &amp; use.</li> <li>• Method of laying out PVC pipe.</li> </ul>	<ul style="list-style-type: none"> <li>• Water purification stages and methods</li> <li>• Impurities of water – organic and inorganic impurities</li> <li>• Sources of water</li> <li>• Different kinds of joints in joining pipes- GI,PVC/CPVCand HDPE etc.</li> </ul>
22,23	Project work / on the job training	
24	Revision	
25,26	Examination	

## Syllabus for the Trade of Plumber under CTS

**First Semester (Semester Code No. –PLR:SEM-I)**

**Duration: Six Months**

### Syllabus for Workshop Calculation and Science

Week No.	Syllabus for Workshop Calculation and Science
2.	<ul style="list-style-type: none"><li>• Applied workshop problems involving multiplication and division.</li><li>• Common fraction addition, subtraction, multiplication and division, application of fractions to shop problems.</li><li>• CGS and FPS system of units of length, weight, their conversion.</li></ul>
3,4	<ul style="list-style-type: none"><li>• Proportions and uses of cast iron, wrought iron, plain carbon steel, high speed steel and alloy steel.</li><li>• Applied workshop problems as in week no. 2.</li><li>• Metric system metric weights and measuring units.</li></ul>
5.	<ul style="list-style-type: none"><li>• Applied workshop problems as in week no. 2.</li></ul>
6.	<ul style="list-style-type: none"><li>• Identification of elementary properties and uses of copper zinc lead, tin, aluminium, brass, bronze, solder, bearing metals, timber. Asbestos, plastic materials, ceramic, asphalt.</li><li>• Decimals, addition, subtraction, multiplication,</li><li>• conversion of decimals of common fraction.</li><li>• Applies problems.</li></ul>
7.	<ul style="list-style-type: none"><li>• Properties &amp; uses of copper, zinc, lead, tin, aluminium, brass, bronze, solder, bearing metals, timber, rubber, leather, asbestos, plastic materials, ceramic asphalt etc.</li><li>• Reduction of common fraction to decimal fractions,</li><li>• shop problems.</li></ul>
8.	<ul style="list-style-type: none"><li>• Reduction of common fraction to decimal fraction applied problems.</li></ul>
9,10	<ul style="list-style-type: none"><li>• Metric system, metric measurement &amp; metric units.</li></ul>
11,12	<ul style="list-style-type: none"><li>• square root the square root of a perfect square.</li><li>• the square root of a whole number and a decimal.</li></ul>
13	<ul style="list-style-type: none"><li>• The weight of a body, unit of weight shop problems.</li></ul>
14,15	<ul style="list-style-type: none"><li>• Percentage and its application – shop problems.</li></ul>
16,17	<ul style="list-style-type: none"><li>• Ratio and proportion, applied problems.</li><li>• Work power, energy, and its unit</li><li>• applied Problems.</li></ul>
18	<ul style="list-style-type: none"><li>• Definition of friction related terms,</li><li>• terms, different types with examples,</li><li>• problems on friction on plain and inclined surfaces.</li></ul>
19	<ul style="list-style-type: none"><li>• Measuring of friction examples,</li><li>• meaning of center of gravity example.</li><li>• Specify gravity.</li></ul>
20	<ul style="list-style-type: none"><li>• Mensuration on areas of rectangle, square triangle, circle, regular polygons etc.</li><li>• Calculation of area.</li></ul>

21	<ul style="list-style-type: none"> <li>Mensuration areas of rectangle, square triangle, circle, regular polygons etc.</li> </ul>
22 to 26	Revision & Examination

## Syllabus for the Trade of Plumber under CTS

**First Semester (Semester Code No. –PLR:SEM-I)**

**Duration: Six Months**

### Syllabus for Engineering Drawing

Week No.	Engineering Drawing
2.	<ul style="list-style-type: none"> <li>Free hand sketching of straight line rectangles squares, circles, polygons etc. (IS : 696)</li> </ul>
3	<ul style="list-style-type: none"> <li>Free hand sketching with dimension to scale and proportionate sketching.</li> </ul>
4	<ul style="list-style-type: none"> <li>Free hand sketching with dimension to scale and proportionate sketching.</li> </ul>
5	<ul style="list-style-type: none"> <li>Reading of simple Engg. Drawing. Free hand sketching of nuts, bolts with dimensions.</li> </ul>
6	<ul style="list-style-type: none"> <li>Free hand sketching of rivets and washers with dimensions from sample. Use of drawing instruments, T-square &amp; Drg. Board.</li> </ul>
7	<ul style="list-style-type: none"> <li>Sketching of views of simple bodies when viewed perpendicular to their surfaces &amp; axis.</li> </ul>
8,9	<ul style="list-style-type: none"> <li>Simple orthographic projection first angle.</li> </ul>
11.	<ul style="list-style-type: none"> <li>Simple orthographic projection third angle.</li> </ul>
12.	<ul style="list-style-type: none"> <li>Simple orthographic projection third angle.</li> </ul>
13.	<ul style="list-style-type: none"> <li>Simple orthographic projection third angle.</li> </ul>
14.	<ul style="list-style-type: none"> <li>Simple orthographic projection third angle.</li> </ul>
15,16	<ul style="list-style-type: none"> <li>View of simple hollow and solid bodies with dimensions. Use of different types of lines and symbols for drawing.</li> </ul>
17,18	<ul style="list-style-type: none"> <li>View of simple hollow solid bodies with different types of lines &amp; symbols for drawings. Plumbing symbols.</li> </ul>
19,20	<ul style="list-style-type: none"> <li>Simple isometric drawings. Isometric views of simple objects such as squares, rectangles, cubes, rectangular blocks etc.</li> </ul>
21	<ul style="list-style-type: none"> <li>Conversion of orthographic views of solid objects like cubes, parallelopoids, prisms, cones, cylinders, etc. Into isometric views. Construction of simple figures and solids such as cubes rectangular block cylinders etc.</li> </ul>
22 to 26	Revision & Examination



## Syllabus for the Trade of Plumber under CTS

Second Semester (Semester Code No. –PLR:SEM-II)

Duration: Six Months

### Syllabus for TP 02 and TT 02

## Syllabus for the Trade of Plumber under CTS

Week No.	Trade Practical	Trade Theory
1.	<ul style="list-style-type: none"><li>Laying out of hummed and asbestos pipes -according to drawing alignment of pipes and joining them.</li><li>Repair of leaks. (The pipe of minimum dia should be used).</li></ul>	<ul style="list-style-type: none"><li>Use of hummed and asbestos pipes of different sizes.</li><li>Method of laying out pipes alignment and joining.</li></ul>
2.	<ul style="list-style-type: none"><li>Joining of pipes with different materials and diameters with various fittings.</li></ul>	<ul style="list-style-type: none"><li>Description of various pipe joints- straight, Branch , Taft and blow, Expansion joints. Solders and fluxes used in joints.</li></ul>
3,4	<ul style="list-style-type: none"><li>Installation of electric pumps (centrifugal, reciprocating, submersible pumps, etc.)</li></ul>	<ul style="list-style-type: none"><li>Description of Plumber's materials Lead, tin, Zinc, solder, copper, red leadetc. and their uses.</li></ul>
5.	<ul style="list-style-type: none"><li>Repair of hand water pumps and other pumps</li></ul>	<ul style="list-style-type: none"><li>Water supply system of a small town.</li><li>Description and types of pumps viz.suction pump, Centrifugal pump etc. Contamination of water in a well.</li></ul>
6,7	<ul style="list-style-type: none"><li>practice on cutting threads (internal and external) on PVC pipes and joining for different purpose</li></ul>	<ul style="list-style-type: none"><li>Description of pipe dies, their uses, care and precaution.</li><li>Metric specification of various pipes.</li><li>Standard pipe threads.</li><li>Method employed for bending, Joining and fixing PVC pipe.</li><li>Joining material for water and gas pipes.</li></ul>

		<ul style="list-style-type: none"> <li>• Use of blow lamp.</li> </ul>
8.	<ul style="list-style-type: none"> <li>• Construction of inspection chamber, manholes, gully traps.</li> </ul>	<ul style="list-style-type: none"> <li>• Inspection chamber, septic tank, description of drains, cess pools, soak pits etc.</li> <li>• Types of traps</li> <li>• layout of drainage system</li> </ul>
9.	<ul style="list-style-type: none"> <li>• Testing of drainage lines smoke test, water test, smell test, ball test, mirror test.</li> <li>• Joining cast iron socket pipe.</li> <li>• Running with lead and Caulking.</li> </ul>	<ul style="list-style-type: none"> <li>• Method of bending pipes by hot and cold process.</li> <li>• Method of testing drainage lines</li> </ul>
10	<ul style="list-style-type: none"> <li>• Tracing out leakages and repairing of water supply system.</li> <li>• Removal of air locks.</li> <li>• Rain water harvesting system</li> </ul>	<ul style="list-style-type: none"> <li>• Method of dismantling and renewal of the valves and pipes. Leaks in pipes and noises in plumbing.</li> <li>• Installation of water meters. Air lock in pipes and its removal.</li> </ul>
11.	<ul style="list-style-type: none"> <li>• Practice on fixing of different water, gas and steam cocks and valves,</li> <li>• Repairing practice including renewal of packing, washer, gasket etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Description of cocks &amp; valves-their types, materials &amp; advantages for particular work.</li> </ul>
12,13 & 14.	<ul style="list-style-type: none"> <li>• Erecting simple water supply system including Installation of water meter.</li> <li>• Branching of pipes. Fixing, testing &amp; repair of Bath tub, wash. basin etc.</li> <li>• Erecting rain water and drainage piping system.</li> <li>• Installation of sanitary fittings like water closets, urinals</li> </ul>	<ul style="list-style-type: none"> <li>• Erecting rain water and drainage pipe system,</li> <li>• installation of sanitary fittings, inspection and testing of water supply system.</li> <li>• -Pipe alignment and slope. -Prevention of water hammer.</li> <li>• Storage tanks for general water supply propose.</li> <li>• Test for water supply pipes.</li> <li>• Description of sanitary fittings,</li> <li>• general points to be observed when choosing sanitary</li> </ul>

		fittings.
15	<ul style="list-style-type: none"> <li>practice on bending copper tubes using bending machine or sand loading process</li> </ul>	<ul style="list-style-type: none"> <li>Type of joints used for different materials such as zinc, lead, copper, etc.</li> </ul>
16	<ul style="list-style-type: none"> <li>Bending of galvanized pipe as per drawing using bending machine.</li> <li>Bending of steel pipe loaded with dry sand by heating.</li> </ul>	<ul style="list-style-type: none"> <li>Method of bending galvanized and other heavy pipes.</li> <li>Fire hydrants</li> </ul>
17,18	<ul style="list-style-type: none"> <li>Fixing of C.I. external water pipe with branch to receive lead waste pipe from bath &amp; wash basin and another branch – lead waste pipe from sink.</li> <li>Fixing of external soil pipe with sand branch fitted to take lead soil pipe from W.C.</li> <li>Fixing of rain water gutter, outlet and ground pipe.</li> <li>Preparation and fixing of lead sink waste. Measurement, preparation and fixing up of lead wastes from wash basin and bath.</li> </ul>	<ul style="list-style-type: none"> <li><b>Domestic drainage system:</b></li> <li>General layout,</li> <li>one pipe system,</li> <li>specifications of materials required.</li> <li>Method of testing leakage. -Different types of traps, ventilation, antisiphonage and sinks.</li> </ul>
19	<ul style="list-style-type: none"> <li>Measurement, cutting, preparation and fixing up of rising mains and</li> <li>Distributing pipes as per layout.</li> <li>Preparation and fixing of hot and cold services to the bath and wash basin as per layout.</li> <li>Installation of hot water system.</li> <li>Description of solar water heating system.</li> </ul>	<ul style="list-style-type: none"> <li>Concept of heat and Temperature.</li> <li>Method of transmission of heat.</li> <li>Heating system by different thermal units.</li> <li>Domestic hot and cold water.</li> <li>General layout, specification of materials required and</li> <li>Connection of pipes to mains.</li> <li>Tracing leakage.</li> <li>Repairs to service main.</li> <li>Domestic boilers and Geysers.</li> <li>Method of ventilating pipe.</li> <li>Precaution against air Poisoning.</li> </ul>

		<ul style="list-style-type: none"> <li>• Fixing of solar water system.</li> </ul>
20	<ul style="list-style-type: none"> <li>• Repairing of waste outlet with putty and lead washer.</li> <li>• Reconditioning of taps, valves, over head tanks, flushing tank etc.</li> <li>• Testing for correct functioning.</li> <li>• Pressure test using hydraulic pressure testing machine</li> </ul>	<ul style="list-style-type: none"> <li>• Plumbing symbols and plumbing codes for all tools and materials</li> </ul>
21	<ul style="list-style-type: none"> <li>• Cleaning of sanitary installations including. pipes.</li> <li>• Scraping and painting of pipes.</li> <li>• Repairing of broken or cracked sanitary fittings.</li> </ul>	<p>Sensor system for urinals and was basin, etc.</p> <p>Corrosion - causes and remedies, prevention.</p> <p>Corrosion due to electrolytic action.</p> <p>Effect of water and frost on materials.</p> <p>Layout of pipes as per drawing.</p>
22,23	Project work / on the job training	
24.	Revision	
25,26	Exam.	

## Syllabus for the Trade of Plumber under CTS

**Second Semester (Semester Code No. –PLR: SEM-II)**

**Duration: Six Months**

### Syllabus for Workshop Calculation and Science

Week No.	Syllabus for Workshop Calculation and Science
1.	<ul style="list-style-type: none"><li>• Calculation of area, calculation of volume and weight of solid bodies such as cubes squares and hexagonal prisms, shop problems.</li></ul>
2.	<ul style="list-style-type: none"><li>• Heat and temperature their metric scale Fahrenheit and centigrade scales and their conversion. Name and use of temperature measuring instruments used in workshops.</li></ul>
3,4	<ul style="list-style-type: none"><li>• Heat and temperature their metric scale Fahrenheit centigrade scales and their heat &amp; temperature, corrossions, name &amp; use of temperature measuring instruments used in workshop. Shop problems on determination of volumes and weight of simple solid objects.</li></ul>
5	<ul style="list-style-type: none"><li>• Shop problems on determination of volumes and weight of simple solid objects.</li></ul>
6,7	<ul style="list-style-type: none"><li>• Workshop problems on determination of volume and weight of simple solid bodies. Geometric properties of lines, angles, triangles and circles.</li></ul>
8	<ul style="list-style-type: none"><li>• Workshop problems on determination of volume and weight of simple solid bodies. Geometric properties of lines, angles, triangles and circles. Simple problems on lines, angles, triangles and circles.</li></ul>
9	<ul style="list-style-type: none"><li>• Simple estimation or requirements of material for different jobs. Shop problems in determination of volume and weight of simple solid bodies.</li></ul>
10	<ul style="list-style-type: none"><li>• Calculation of volume and weight of pipes of different dia and thickness. Determination of pipe length.</li></ul>
11	<ul style="list-style-type: none"><li>• Calculation of volume and weight of pipes of different dia and thickness. Determination of pipe length. Simple estimation of pipe requirements etc. for different types of jobs. Calculation of volume and weight of water in container of different sizes.</li></ul>
12,13 & 14	<ul style="list-style-type: none"><li>• Simple estimation of pipe requirements etc. for different types of jobs. Calculation of volume and weight of water in container of different sizes.</li></ul>
15	<ul style="list-style-type: none"><li>• Electricity and its uses, electric current positive and negative terminals. Use of switches and fuses, conductor &amp; insulators.</li></ul>
16	<ul style="list-style-type: none"><li>• Reading of simple graphs.</li></ul>
17,18 & 19	<ul style="list-style-type: none"><li>• Meaning of work and energy. Explanation of energy H.P. Shop problems. Reading of simple graphs.</li></ul>
20,21	<ul style="list-style-type: none"><li>• Estimation on requirements of materials for pipe. Layout and installation.</li></ul>
22 to 26	Revision & Examination

## Syllabus for the Trade of Plumber under CTS

**Second Semester (Semester Code No. –PLR: SEM-II)**

**Duration: Six Months**

### Syllabus for Engineering Drawing

Week No.	Engineering Drawing
1.	<ul style="list-style-type: none"><li>• Construction of simple figures and solids, such as cubes, rectangular blocks, cylinders etc. With dimensions and title. Use of different types of scales in inches and millimeters.</li></ul>
2.	<ul style="list-style-type: none"><li>• Lettering number &amp; alphabets. Freehand isometric sketching of simple objects with dimensions.</li></ul>
3,4	<ul style="list-style-type: none"><li>• Line diagram of the water service line. Free hand isometric sketching of simple objects with dimensions.</li></ul>
5	<ul style="list-style-type: none"><li>• Free hand isometric sketching of simple objects with dimensions.</li></ul>
6,7	<ul style="list-style-type: none"><li>• Free hand isometric sketching of simple objects with dimensions.</li></ul>
8	<ul style="list-style-type: none"><li>• Free hand sketching plan and elevation of simple objects like hexagonal bar square bar, circular bar, tapered bar, hollow bar.</li></ul>
9	<ul style="list-style-type: none"><li>• Free hand sketching plan and elevation of simple objects like hexagonal bar square bar, circular bar, tapered bar, hollow bar. Views of simple solid and hollow bodies cut by section plane. Free hand isometric sketching of simple objects with dimensions.</li></ul>
10	<ul style="list-style-type: none"><li>• Layout plan of a small village or town and mark the water line with valves of all types &amp; the position of the reservoir.</li></ul>
11	<ul style="list-style-type: none"><li>• Exercise on Engg. Drawing.</li></ul>
12,13 & 14	<ul style="list-style-type: none"><li>• Building plan &amp; mark the position of the sanitary fittings, water supply line, drainage line connection to sewage line. Study of building plan &amp; mark the position of the sanitary fittings, water supply line, drainage line connection to sewage line.</li></ul>
15	<ul style="list-style-type: none"><li>• Study of building plan &amp; mark the position of the sanitary fittings, water supply line, drainage line connection to sewage line.</li></ul>
16	<ul style="list-style-type: none"><li>• Study of building plan &amp; mark the position of the sanitary fittings, water supply line, drainage line connection to sewage line.</li></ul>
17,18 & 19	<ul style="list-style-type: none"><li>• Free hand sketching of simple objects related to the trade and preparation of simple working drawings from the sketches.</li></ul>
20,21	<ul style="list-style-type: none"><li>• Longitudinal section of the house drain. Drainage arrangements of workshop of an institution.</li></ul>
22 to 26	Revision & Examination

# TRADE : PLUMBER (CTS)

## LIST OF TOOLS & EQUIPMENTS

### A. TRAINEES TOOL KIT FOR 20 TRAINEES AND ONE INSTRUCTOR

SL. No.	Name of items	Quantity
1.	Rule Steel 300 mm both in inch and mm	21 Nos.
2.	Rule Wooden 4 fold, 600 mm	21 Nos.
3.	Hacksaw Frame adjustable for 250 to 300 mm	21 Nos.
4.	Scriber 200 mm	21 Nos.
5.	Centre punch 100 mm	21 Nos.
6.	Chisel Cold, flat 20 mm	21 Nos.
7.	Hammer ball pein 800 grams	21 Nos.
8.	Hammer ball pein 50 grams	21 Nos.
9.	File flat rough 300 mm	21 Nos.
10.	Level spirit wooden 300 mm	21 Nos.
11.	Plumb bob 50 grams	21 Nos.
12.	Trowel C-125-I S: 6013	21 Nos.
13.	Stillson wrench 200 & 350 mm	21 Nos.
14.	Screw Driver 250 mm	21 Nos.
15.	Wooden Mallet small I S: 2022	21 Nos.
16.	Cutting pliers 200mm I S : 3650	21 Nos.
17.	Steel tape (5m)	21 Nos.

# TRADE : PLUMBER (CTS)

## LIST OF TOOLS & EQUIPMENTS

### B. TOOLS, MEASURING INSTRUMENTS & GENERAL SHOP OUTFIT:

SL. No.	Name of items	Quantity
1	Surface plate 400 X400 mm Grade I	1no.
2	Marking Table 900X600X900mm high	1no.
3	'V' Blocks with clamps 80/7-63A IS 2949	2nos.
4	Combination set 200 mm	1no.
5	Scribing Block, Universal, 300 mm	2nos.
6	Hand Vice, Jaw 50 mm	2nos.
7	File Flat, Smooth 200 mm	2nos.
8	File Half Round, Rough 300 mm	2nos.
9	File, Square, rough 250 mm	2nos.
10	File, Square, Smooth 200 mm	2nos.
11	File Triangular Rough 250 mm	2nos.
12	File Flat Rasp 250 mm	2nos.
13	File Triangular Smooth 200 mm	2nos.
14	Chisel Cold Flat 20 mmX300mm	2nos.
15	Chisel Cross Cut 6X150 mm I S-402	2nos.
16	Chisel Round Nose 3X150 mm I S -402	2nos.
17	Chisel Diamond Point 6X150mm	2nos.
18	Tap and Die set to cut B.S.F. , B.S.W. and metric threads of sizes No.6 to M-12	1 set each
19	Screw Pitch gauge to cover above threads	1set
20	Punch , Letter set	1no.
21	Punch , Number set	1no.
22	Saw Plumber 300mm	2 Nos.
23	Spanner monkey up to 50mm	2Nos.
24	Stove melting solder	1Nos
25	Cutter ,Pipe, wheel type 6mm to 25mm	1 Nos.
26	Oil stone 150X50X25mm	2 Nos
27	Soldering Iron , Copper , Bit , Fire heated , Hatched , Straight , 500 grams	4 Nos.
28	Snip Straight 250mm	2 No.
29	Snip bend 250mm	2 No.
30	Try square 200mm	2 Nos.
31	Inside Caliper 150mm	2 Nos
32	Caliper outside 150mm	2 Nos
33	Odd leg calliper 200mm	2 Nos.
34	Tenon saw	2 Nos.
35	Hand Saw.	2 Nos
36	Mortise Chisel	2 Sets
37	Firmer Chisel	2 Sets.
38	Mallet Medium IS: 2922	2 Nos.
39	Jack plane	2 Nos.



40	Gas Welding set with oxygen acetylene cylinder	1 No.
41	Goggles pair welder 100 mm	2 pairs.
42	Brush Steel Wire 150X 50 mm	1 No.
43	Table welding 1200X 750 mm with fire bricks top and stand	1 NO.
44	Pliers combination, 200 mm	2 Nos.
45	Blow lamp 500 mili litre	2Nos.
46	Washer cutter	1 No.
47	Mirror 100X150 mm	2 Nos.
48	Scribing gauge	1 No.
49	Soil pot with brush	1 No.
50	Pot- Hook	1 No.
51	D. E. Spanners 7X8, 10X11, 13X1. 7, 19X2.2, 24X27 IS:2028	2 Sets
52	Branch Gimlets	2 Nos.
53	Bending Spring	1 Set
54	Plumbers Laddle	2nos
55	Tool caulking set of S	2 nos.
56	Plumbers' metal melting pot 10 kg	1 no.
57	Pipe stock and dies complete with stocks, bushing , bushing holders, Taps and wrenches sizes covered, to suit pipes of bore dia 6,8,10,20,25,32,40,&50mm	4 sets
58	Pipe vice to grip up to 77 mm is -2587	8 nos.
59	Stillson pattern pipe wrenches 450 mm to take pipe up to 52 mm dia l s -4003	2sets
60	Stillson pattern pipe wrenches 300mm to take pipe 20 mm to 32mm	2sets
61	Chain :pipe wrench 90mm -650 is 4123	2sets
62	Adjustable, spanner, A-375, IS- 6149	2nos
63	Anvil 50 or 63 kg. IS- 510	1no
64	Pipe bender, manually operated	1no
65	Leg vice, 75mm jaw on Stand IS -2588	1no
66	Hand drill 6mm capacity with drill chuck (Electric)	1no
67	Drill Twist (straight shank ) 3mm to 6mm	1set
68	Portable forge ,450mmwith hand blower	1no
69	Flat smithy tong	2nos.
70	working bench 2400x1200x750mm with 4 voice 125 mm jaws	2nos.
71	Bath tub small size	1no.
72	Wash Basin (16"X14"X10")Equivalent metric	2nos.
73	Water Heater 10 litres	1no
74	Water closet (European type p) complete with over head cistern	1set
75	Water closet (Indian type ) complete with over head cistern	1set
76	Urinal wall type complete with automatic system	1set
77	Water meter	2nos.
78	Steel lockers with 8 drawers Metal rack (1800x1500x450mm)	3nos.
79	Metal rack (1800X1500X450mm)	1no
80	Desk	1nos
81	Stool	1 nos
82	Black Board with glass	1no
83	Fire Extinguisher	1no
84	Fire Buckets with stand	1nos.
85	Steel Almirah (large)	1no
86	Hammering drilling machine	1no.
87	Electric PPR pipe welding machine	1 No
88	Electric pump, 1 HP	1 no.
89	D.E. PEDESTAL GRINDER WITH TWO WHEELS 175MM ROUGH AND SMOOTH	1 No.
90	Hydraulic pressure machine for testing leakage in GI pipe fittings etc.	1No.
91	Sight rail and bonning rod	1 No.

92	Rachet pipe die 15 mm to 32 mm	1 No.
93	Bench drilling machine with chuck and key upto 15mm capacity	1 No.
94	Double face hammers	2 No.
95	Dormat, Pickaxe, Spade, Girmale	1 each
96	Pipe bender(Hydraulic type)	1 No.
97	Instructor table	1 No.
98	Instructor chair	1 No.
99	Solar water heater system	1No
100	Ring guage 15 mm,20mm,25mm,32mm	1 each

## TRADE: PLUMBER (CTS)

### LIST OF CONSUMABLES FOR SEM – I

SL NO.	DESCRIPTION
1	M.S FLAT
2	M.S ROD
3	GI pipe "B" grade - ½ " $\phi$ ., ¾ " $\phi$ ., 1 " $\phi$ .
4	GI pipe fittings Socket Tee Bend ( ½ " $\phi$ ., ¾ " $\phi$ ., 1 " $\phi$ .) Union Hex Nipple
5	Wooden plank – 50mm x 25 mm x 1 m 100mm x 25mm x 1 m)
6	MS gas welding filler rod.
7	Wire cut clay bricks
8	River sand AFS no.100 ~ 40
9	Stone aggregate
10	Cement portland
11	Copper tubes 6 mm $\phi$ , 25 mm $\phi$ .
12	Copper brazing filler rod
13	PVC pipes heavy duty (suitable to use dies and tap) ½ " , ¾ " , 1 " , 1 ½ " , 2" , 4" , 6" $\phi$
14	PVC pipe light duty ½ " , ¾ " : 1 " , 1 ½ " , 2" $\phi$
15	PVC fittings – reducer FTA Reducer, Plain coupling, TEE, Bend, Elbow, MTA, FTA , socket - ½ " , 1 " , 1 ½ " , 2" , 4" , 6" $\phi$
16	C.PVC pipe 20 mm $\phi$
17	PPR pipe 20mm $\phi$
18	AC sanitary pipe coupling 100 mm $\phi$
19	AC pressure pipe coupling 100 mm $\phi$
20	CI water supply pipe bell and spigot end
21	CI water supply pipe flanged end
22	Wheel valve
23	Globe valve
24	PVC ball valve
25	Water tap/ PVC, S.S, Brass size ( ½ " , ¾ " , 1 " )
26	Non- return valve, Air valve
27	M.S flange
28	C.I.D joint 100mm
29	Lubricating oil
30	Lead
31	Spum yarn
32	Oxygen gas
33	Acetylene gas

# TRADE: PLUMBER (CTS)

## LIST OF CONSUMABLE ITEMS FOR SEM- II

SL NO.	CONSUMABLE ITEMS
1	Water meter
2	PVC bend 100 mm
3	PVC Y branch 100 mm
4	PVC Dod bend 100 mm
5	PVC pipe sloe
6.	C.P piller tap 15 mm
7	C.P waste coupling 35 mm
8	PVC waste pipe 32 mm
9	Rock bolt
10	PVC connection flexible tube
11	Hot and cold water mixer tap
13	PPR pipe fittings PPR - TEE 20 mm PPR – Elbow 20 mm
14	PVC floor trap
15	PVC gully trap
16	PVC multi trap
17	PVC multi floor trap
18	White cement
19	P O P (Plaster of paris)
20	Gasket's etc
21	Push lock

## As per job sheet modify our C.M

### NOTE:

- 1.No additional items are required to be provided for the batch working in the second shift except the item under trainee's tool kit and lockers.
2. Items marked (\*) are not required to be purchased where WELDER trade is running under the same institute.
3. Items such as sockets, elbow, u-1rap, w-Trap, pipes etc. required for day to day plumbing work should be purchased.
4. The specification of the items in the above list has been given in Metric Unit and is based on the ISI Standards wherever available. While procuring the I.S.I specifications should be strictly followed Measuring instrument such as steel rule which are graduated both in English and Metric unit may be procured, if available.

# **TRADE: PLUMBER (CTS)**

## **Trade Testing and Certification**

Same as for other similar Non-Engineering Trades

# **TRADE: PLUMBER (CTS)**

## **Further Learning Options**

After successful completion of CTS Course in the Trade of Plumber, the trainees have the option to continue their further studies by joining the CITS Course in the same Trade.

# TRADE: PLUMBER (CTS)

## List of Trade Committee Members

Sl.No	NAME& DESIGNATION S/SHRI	REPRESENTING ORGANIZATION	REMARKS
1			
2			
3			
4			
5			
6			
7			