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SYLLABUS FOR **PLUMBER**

UNDER

CRAFTSMEN TRAINING SCHEME & APPRENTICESHIP TRAINING SCHEME

As approved by
GOVERNMENT OF INDIA

In consultation with
THE NATIONAL COUNCIL FOR
VOCATIONAL TRAINING
&
CENTRAL APPRENTICESHIP COUNCIL

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DIRECTORATE GENERAL OF
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NEW DELHI

2004 (Revised)

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**LIST OF TRADE COMMITTEE MEMBERS
FOR THE TRADE OF 'PLUMBER'**

CHAIRMAN

Shri M.S. Lingaiah

: Director
CSTARI, Salt Lake, Kolkata-91

Members

(S/Shri)

- | | |
|---|---|
| 1. Nabarun Biswas
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Salt Lake Kolkata-91 |
| 2. K.C. Das
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| 5. T. Mukhopadhyay
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| 7. M.S. Ekambaram
Asst. Director | : CSTARI, Kolkata-91 |
| 8. P.K. Kolay
Training Officer | : CSTARI, Kolkata-91 |

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GENERAL INFORMATION

1. Name of the Trade : PLUMBER
2. N.C.O. Code No. : 871.10
3. Entry Qualification : Passed in VIII Class Examination under 10+2 system of education or its equivalent
4. Duration of Craftsmen Training : One Year
5. Duration of Apprenticeship Training : 02 years including one year basic training
6. Rebate of Ex-ITI/ITC Trainees : One year for Ex-ITI/ITC
Passed out Trainees in the trade of Plumber
7. Unit Size : Plumber 16 trainees
8. Ratio of Apprentice to Workers : 1 : 2
9. Space requirement : 80 m²

Note :

1. Civil building Contractors/Civil construction industries / Industries which are involved in plumbing related work should employ the apprentices under Apprenticeship Act.
2. The Practical Training Programme of Apprentices under ATS (Apprentices Training Scheme) should be as per the facilities available in the establishment.
3. Question papers are not set on all India basis for final examination at the end of Shop Floor Training and the examination is conducted at establishment level, based on actual on the job training.

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SYLLABUS FOR THE TRADE OF PLUMBER UNDER C.T.S.

Syllabus for 1st Year of Training (52 weeks)—Trade Practical and Related Instructions

Practical	Theory	Engineering Drawing	Workshop Calculation & Science
2	3	4	5
ization with the Institute im- of trade training Machinery the trade. Types of work trainees in the Instt. Types made by the trainees in the and tools : Use of steel rule, square, scriber and divid- saw, centre punch, calipers erent files, bench vice and e.	Importance of the trade in the develop- ment of industrial economy of the coun- try. Importance of safety and general precautions observed in the Instt. And in the sections. Medical facilities, rec- reational, extra curricular activities of the Institute. What is related instruc- tion subjects to be taught and achieve- ment made. Necessary guidance to be provided to the new comers to become familiar with the working of industrial Training Institute. Safety precautions and elementary first aid, fitters common hand tools, names, description and materials from which they are made.	Free hand sketching of straight lines rectangles squares, circles, polygons etc. (IS : 696)	Applied workshop problems involving multiplication and di- vision. Common fraction addi- tion, subtraction, multiplication, and division, application of frac- tions to shop problems. CGS

(4)

2	3	4	5
acksaw, centre punch filing drilling holes.	Description of simple fitting operations, hacksawing, punching and filing and types of files, marking instruments and their use.	Free hand sketching with di- mension to scale and propor- tionate sketching.	and FPS system of units of length, weight, their conversion. Proportions and uses of cast iron, wrought iron, plain car- bon steel, high speed steel and alloy steel. Applied workshop problems as in week No. 2. Metric system metric wrights and measuring units. Applied workshop problems as in week No. 2.
ammers chipping and grind- Chisels, cold chisel, round isel, drilling and tapping, mak- tuds and bolts. a job flat and square various devices. Fastening devices fixing of check nut locking	Method of using drills, taps and dies. Description of simple drilling machine. Description of different types of lock- ing and fastening devices. Description of different types of lock- ing and fastening devices.	Free hand sketching with di- mension to scale and propor- tionate sketching.	
soldering iron, hand forge, ing practice.	Method of soldering fluxes in soft sol- dering precautions to be observed while soldering. Soft solder and its composi- tion properties and its use. Different preparation of plumber soldering braz- ing of ferrous & non-ferrous metals, their merits & demerits.	Reading of simple Engg. Draw- ing.	Identification of elementary properties and uses of copper zinc lead, tin, aluminium, brass, bronze, solder, bearing metals timber.

(5)

2	3	4	5
of pipes and various sizes in angles and tees.	Advantages of suning brazing. Different kinds of jointing in joining pipes pipe description of PVC welding torch and filler rod.	Free hand sketching of rivets and washers with dimensions from sample. Use of drawing instruments, T- square & Drg. Board.	Properties & uses of copper, zinc, lead, tin, aluminium, bras, bronze, solder, bearing metals, timber, rubber, leather, asbes- tos, plastic materials ceramic asphalt etc. Reduction of com- mon fraction to decimal frac- tions, shop problems.
Carpenters hand tools in- sawing planing, criseling ar joins a wood.	Carpenter's hand tools and their names materials from which they are made common types of wood : their descrip- tion & use.	Sketching of views of simple bodies when viewed perpen- dicular to their surfaces & axis.	Reduction of common fraction to decimal fraction applied prob- lems.

I be able to :
rs hand tools.
sawing clipping, filing, grinding of chisels, drilling and tapping.
ring
arpenr's hand tools.
d Sawing planing and chiseling, making tap joints.

2	3	4	5
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BUILDING CONSTRUCTION FROM 10th TO 15th WEEK.

mansons hand tools straight irit level, plumb bob square	Safety precautions and elementary first aid related description & use of ma- son's hand tools.	Simple orthographic projection first angle.	Metric System, Metric Meas- urement & Metric Units.
rick laying including setting k with manson hand tools.	Specification and property of bricks laying types of bricks such as T.M. Bricks, country bricks & application. Description of brick bonds & mixes.	Simple orthographic projection third angle	-do-
ction of a gully traps using 1 cement mortar.	Notes on cement lime, Preparation of cement mortar of varying proportion, construction of gully traps.	Simple orthographic projection 3rd angle.	Square root the square root of a perfect square the square root of a whole number and a deci- mal.
ction of an inspection cham- ny convenient size forming g and channelling and plas- e walls.	Method of inspection of chamber, sep- tic tank.	Simple orthographic projection 3rd angle.	The Weight of a body, unit of weight shop problems.
ig damaged portion of the flooring using cement mor- ete.	-do-	-do-	Percentage and its application shop problems -do-

2	3	4	5
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PLUMBER 16th TO 51st WEEK

d care of the plumbers hand nd equipment. Identification stration and precautions to be ed.	Safety precautions & elementary first aid. Description of plumbers tools and equipment.	View of simple hollow solid bodies with different types of lines & symbols for drawings.	Radio and proportion, Applied problems.
g of pipes of different metals rent dimensions.	Care & use of tools, materials used in plumbing. Ferrous metals, cast iron mild steel & its properties and uses.	Plumbing symbols.	Work power, energy, and its Unit-applied problems
of waste pipe cast iron & AC itable bends, with junction g with lead & cement.	Materials used in plumbing non- ferrous metal, brass, copper, zinc, lead, tin, solder, gun metal, Teflon tap & hold tight and its use in plumbing work White lead and Red lead.	Simple isometric drawings. Iso- metric views of simple objects such as squares, rectangles cubes, rectangular blocks etc.	Definition of friction Related terms, terms, different types with examples, problems on friction on plain and inclined surfaces.
of rain water pipe with RW hoe and its terminal. aining store water).	Description of soil and waste pipe. Description of rain water pipe. Single & double pipe system, specials used in soil and waste pipe line work.	Simple isometric drawings. Iso- metric views of simple objects such as squares, rectangles cubes, rectangular blocks etc.	Definition of friction related terms, terms, different types with examples, problems on friction on plain and inclined surfaces. Measuring of friction exam- ples, Meaning of center of grav- ity example. Specify gravity.
of vent line pipe for soil and pipe anti siphon pipes.	Description of soil waste pipe. De- scription of vent pipe & its importance. Description of anti siphon pipe and its importance.	-do-	

2	3	4	5
f floor traps, in a bath & Method of testing the soil pipe and waste pipe.	Description of traps, Types of traps.	Conversion of orthographic views of solid objects like cubes, parallelepipeds, prisms, cones, cylinders, etc. into isometric views.	Mensuration on areas of rectangle, square triangle, circle, regular polygons etc. calculation of area.
S : I be able to : ons hand tools. nbers hand tools. t single brick wall. t gully chamber. t inspection chamber. t repairing of the damaged portions. of different metals. alls. ipe, waste pipe, RC pipe with accessories and jointing (using lead and cement). siphon pipe connection and vent pipes. traps. and waste pipes.	Elementary knowledge of sources of water, sources of water composition hard & soft water. Temporary hardness & permanent hardness.	Water supply : Construction of simple figures and solids such as cubes rectangular block cylinders etc.	Mensuration areas of rectangle square, triangles, circle regular polygons etc.

2	3	4	5
imple pipe connection using es.	Impurities in water, suspended and dissolved impurities, purification of water, sedimentation slow sand filtering and mechanical filters. Coagulation.	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.	Calculation of area, Calculation of volume and weight of solid bodies such as cubes squares and hexagonal prisms, shop problems.
ng water meter (drilling C.I. : tapping and fixing ferrule)	Storage tank, distribution of water intermittent and constant water supply system Gravity system, pumping storing & distribution of water.	Lettering number & alphabets. Freehand isometric sketching of simple objects with dimensions.	Heat & temperature their metric scale Fahrenheit and centigrade scales and their conversion. Name and use of temperature measuring instruments used in workshops.
of water pipe connection to itary fitting using different f valves / fittings.	Valves used in plumbing system (sluice valve, reflux valve, scour valve, air valve Pressure relief valve, safety valve) water supply thought pipes.	Line diagram of the water service line.	Heat & temperature their metric scale Fahrenheit centigrade scales and their Heat & Temperature, corrosion, name & use of temperature measuring instruments used in workshop.
and joining of Cast iron pipe ouring and lead caulking)	Free system, grid iron system and radial system. Description of C.I. Pipes, method of joining C.I. Pipes, and GI Pipes, specials and fittings used in CI & GI Pipes.	Free hand isometric sketching of simple objects with dimensions.	Shop problems on determination of volume and weight of simple solid bodies.
on socket pipe heavy, light ining molten lead, lead wool,	Water main street line in water supply as well as soil pipe and drainage system.	Free hand isometric sketching of simple objects with dimensions.	Shop problems in determination of volumes and weight of

2	3	4	5
ing lead sheet corner to corner ice on soldering.			simple solid bodies.
icing on cutting and shapping pipes to sizes, use & fixing of pipes fittings preparation of pipe joints.	PVC description of ISI specification of pipe, properties and use in plumbing work. Method of cutting and preparing joints.	Free hand isometric sketching of simple objects with dimensions.	Workshop problems on determination of volume and weight of simple solid bodies. Geometric properties of lines, angles, triangles and circles.
g of PVC pipe according to ng.	PVC fitting their description and use. Method of laying out of PVC pipes. Saddle connection for house service.	Free hand sketching plan and elevation of simple objects like hexagonal bar square bar, circular bar, tapered bar, hollow bar.	Workshop problems on determination of volume and weight of simple solid bodies. Geometric properties of lines, angles triangles and circles.
e connection from PVC main r house service.	Drawing of water from river bed, infiltration, wells and infiltration galleries.	Free hand sketching plan and elevation of simple objects like hexagonal bar square bar, circular bar, tapered bar, hollow bar.	Simple problems on lines angles, triangles and circles.
g out of asbestos cement pres- pipes with detachable collar joint	Description and use of AC pressure pipes, standard sizes, lengths, specials used. Precaution to be observed while laying the pipes and protection of pipes.	Free hand sketching plan and elevation of simple objects like hexagonal bar square bar, circular bar, tapered bar, hollow bar.	Simple estimation on requirement of material for different jobs.
iber rings taking service con- n from the pipes (saddle con- n) for house service.	Knowledge about different types of water pumps used in domestic purposes. Valves and taps used in service	Views of simple solid and hollow bodies cut by section plane.	Simple estimation or requirements of material for different jobs. Shop problems in
ing hand pump, finding out facts & rectifying the same.			
of shower connection in a			

2	3	4	5
oom.	connection, air lock in the pipes and its removal, water hammer noises in plumbing.	of simple objects with dimensions.	determination of volume and weight of simple solid bodies.
ion of Electrical Pump.	Water supply system of small towns, description of pumps of various types. Centrifugal, piston type, electro type. mono type booster pump, submergible pump.	Views of simple solid and hollow bodies cut by section plane.	Simple estimation on requirement of material for different jobs.
g simple water supply system lay out branching of pipes ing valves wherever neces- d connecting to the storage elivery line and testing the ler pressure.	Storage tanks for general water supply purpose. Tests and water supply pipes. Different types of storage tanks 1. RCC. 2. Steel tank, masonry tanks, water level indicators. Automatic float switch underground tanks, PVC tank vertical type ball valve.	Lay out plan of a small village or town and mark the water line with valves of all types & the position of the reservoir.	Calculation of volume, and weight of pipes of different dia and thickness. Determination of pipe length.
g of C.I. & M.S. pipe up to as per the template (Plain and offset bends).	Advantages of template and their preparation, bending machine and methods of bending their advantages and disadvantages (Cold bending and hot bending).	Exercise on Engg. Drawing.	Calculation of volume, and weight of pipes different dia and thickness, determination of pipe length.
litioning of Taps. Valves, ing tank, Testing for correct ning.	Causes for damage in Taps valves & water meter & Tank etc. Method of rectification & modification.	Exercises on Engg. Drawing.	Calculation of volume, and weight of pipes of different dia and thickness, determination of pipe length.

2	3	4	5
tion by various methods the pipes. ground level. ridge the canal the roads the foundation of a build- soils.	Description to be given while laying pipes of different materials for protect- ing the same from corroding, earth pres- sure, pressure due to vibration, due to load of the building, sinking due to loose soil etc.	Exercises on Engg. Drawing.	Simple estimation of pipe re- quirements etc. for different types of jobs. Calculation of volume and weight of water in container of different sizes.
TS: ld be able to do : l threading of pipes of various sizes. of pipes of different metals - C.I., G.I.M.S., PVC etc. of PVC pipes as per drawing. ig water meter. ig service connection from PVC and AC pressure pipes. ig hand pumps and repair of hand pumps. ig electrical pumps. g of pipes G.I., and M.S. of valves, cocks. al of air lock. out leakages and rectifying the defects. ion of pipes.			

2	3	4	5
ing Indian style water closet gh level / low level of cistern, ing fixing flush pipe connec- water connection etc. and con- the outlet to the drainage line ection chamber. ing European style water closet w level flushing cistern with pipe connecting, fixing of dou- p seat toilet paper holder and ing the outlet to the drainage C.O. Inspection chamber. ing a urinal with automatic ig, cistern fixing lead waste or	Description of sanitary fitting. General points to be observed when choosing sanitary fittings. Description of Indian style water closed and E.W.C. difference between the same. Standard sizes, types, precau- tions to be observed while installing. Types of urinal, description of flash- ing, devices, tripper automatic tank, syphonic. Description of wash basin its standard sizes, types and accessories required for installing wash basin sizes of mir- ror, towel rail, glass shelf, precautions to be observed while installing. Description sink, types of sink, sizes of kitchen sink, pantry sink, bed pan sink, laundry sink, slop sink, sizes of	Building plan & mark the posi- tion of the sanitary fittings, wa- ter supply line, drainage line connection to sewage line. Study of building plan & mark the position of the sanitary fit- tings, water supply line, con- nection to sewage line. Study of building plan & mark the position of the sanitary fit- tings. Study of building plan & mark the position of the sanitary fit- tings, water supply line, drain- age line and connection to sew- age line. Study of building plan & marks the position of the sanitary fit- tings, water supply line, drain-	Simple estimation of pipe re- quirement etc. for different types of jobs. Calculation of volume and weight of water in container at different levels. Simple estimation of pipe re- quirement etc. for different types of jobs. Calculation of volume and weight of water in container at different levels. Simple estimation of pipe re- quirement etc. for different types of jobs. Electricity and its uses, electric current positive and negative terminals, Use of switches and fuses, conductors & insulators. Reading of simple graphs.
ing a wash basin with lead or PVC waste pipe, connect- the pillar tap to service con- n fixing or mirror plate, glass, rowel rail, soap dish, hot and ups with popup. ing a sink with drain board, pipe connecting the waste out- th all fittings. Water service			

2	3	4	5
on to the sink.	waste outlet. Fixing of sink according to their suitability.	age line and connection to sewage line.	
a bath tub with hot and connection with shower, and waste connection soap	Description of bath tub accessories required for installing a bath tub.	Free hand sketching of simple objects related to the trade and preparation of simple working drawings from the sketches.	Meaning of work and energy. Explanation of energy H.P. Shop Problems.
rating the working principle bidet washing through C. range, urinals flushing & method of arrangements & method of arrangement waste outlet. Waste connect the waste to the gully	Importance of introducing the trap of the sanitary fittings. Deep seal traps and low seal traps, crown vent, left side and right side vent, different materials out of which they are made and size available.	Free hand sketching of simple objects related to the trade and preparation of simple working drawing from the sketches.	Reading of simple graphs.
oor trap.			
nd joining of stone ware	Drains - Drainage : Conservancy system and water carriage system, Combined system of drain and separate system of drain and types of drain.	Longitudinal section of the house drain.	Estimation on requirements of materials for pipe. Lay out and installation.
i the help of sight rail and	Method of setting this sight rail and boning rod and radiants to be allowed to be S.W. pipe.	Longitudinal section of the house drain. Drainage arrangements of workshop of an institution.	Estimation on requirements of materials for pipe. Lay out and installation.
od, joining of stone ware			
nd joining of stone ware			
a hole of sight rail and			
od, joining of stone ware			
ording to soil conditions & el.			
a gully trap and connecting	Earth work in excavation for laying drain pipes, precautions to be observed full shoring/ partial shoring for the	Longitudinal section of the house drain. Drainage arrangements of workshop of an institution.	Estimation on requirements of materials for pipe. Lay out and
to a chamber.			

2	3	4	5
ing vent pipe from a shutting	trench, width of the trench in respect of corresponding depth of drain, refilling of trench, testing of drain pipes (Pressure smoke and light test).	tution.	installation.
ion and fixing up of hot water system.	Description of vent pipe its necessary traps used in drainage line, gully trap, interceptor, types of manholes, cesspool, soak pits, septic tanks size of septic tank, according to the users-dispersion trench)	Revision	Estimation on requirements of materials for pipe. Lay out and installation.
ly as per layout. Installation	Heat and temperature transmission of heat heating system. Domestic boilers and geyser, method of ventilating return pipes.	Live diagram showing the hot water line from boiler return, vent pipes.	Revision
g of sanitary fittings, scraping & repairing of pipes tracing out s, air locks in pipe lines and Use of epoxy resin. Demonstration of renewal of the packing	Corrosion - its causes & remedies prevention of corrosion. Corrosion due to electrolytic action. The effect of water and frost on materials. Reasons for packing rope for the gland important points to check the proper working conditions of the pump.	-do- Exercises on Engg. Drg.	-do-
ves taps & electrical pumps.			
..... REVISION & TEST			

TS:

ould be able to do the following :

Indian water closet

European water closet

high level flushing cistern

low level flushing cistern

urinals

automatic tank

flush valve

wash basin

sink

bath tub

d of installing a bidet, working trough range urinals

; jointing of drainage pipes

of gully trap

of vent pipe in drainage system

water heater (geyser)

ining sanitary fitting

iting material requirement for pipe layout for a building making from a pipe layout

visit should be arranged frequently to construction site.

Social Studies. The syllabus already been approved and is same for all the trades.

LIST OF TOOLS AND EQUIPMENTS FOR A BATCH OF OR UNIT OF 16 TRAINEES

Trainees Tool Kit

Sl. No.	Items	For Instructor	For Trainees
1	2	3	
1. TOOL KIT			
1.	Rule steel 300 mm both in inch and nm	1 No.	16
2.	Rule wooden 4 fold 690 mm	1 No.	16
3.	Hucksaw frame adjustable for 250 to 300	1 No.	16
4.	Scriber 200 mm.	1 No.	16
5.	Centre punch 100 mm.	1 No.	16
6.	Chisel cold flat 20 × 250 mm	1 No.	16
7.	Hammer ball peen 800 gms.	1 No.	16
8.	Hammer ball peen 300 mm	1 No.	16
9.	File flat rough 300 mm	1 No.	16
10.	Sprit Level wooden 300 mm	1 No.	16
11.	Plumb bob 50 gms.	1 No.	16
12.	Trowel 125 IS ; 6013	1 No.	16
13.	Stillson wrench 200 & 350 mm	1 No.	16
14.	Screw driver 250 mm	1 No.	16
15.	Wooden mallet small IS ; 2022	1 No.	16
16.	Cutting pliers 200 IS : 3650	1 No.	16
17.	Steel tape	1 No.	16

Tools, Measuring Instruments, Shop Outfit and General Installations.

18.	Surface plate 400 × 400 mm grade	1
19.	Scribing block universal 300 mm	2
20.	Hand vice jaw 50 mm	2
21.	File flat smooth 200 mm	2
22.	File half round rough 100 mm	2
23.	File square rough 250 mm	2

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1	2	3
28.	Chisel cold flat 20 mm × 300 mm	2
29.	Chisel cross cut 6 × 150 mm IS ; 402	2
30.	Chisel round nose 3 × 150 mm IS : 402	2
31.	Chisel diamond point 6 × 150 mm	2
32.	Tap and die set to cut BSP thread	1 Set
33.	Punch letter set	1 Set
34.	Punch number set	1 Set
35.	Chase wedge 50 mm	2
36.	Dresser lead 350 × 50 mm	2
37.	Stick setting in 350 × 50 mm	2
38.	Saw plumber 300 mm	2
39.	Spanner monkry up to 50 mm	2
40.	Cutter, pipe wheel type 6 mm to 25 mm	1
41.	Pipe jointer, lead, universal	1
42.	Oil stone 150 mm × 50 mm × 25 mm	2
43.	Soldering iron, copper fit fire heated, hatched, straingt 500 gms.	4
44.	Snip straight 250 mm & Snip bend	2 each
45.	Try square 200 mm	2
46.	Inside calipaer 150 mm	2
47.	Calipaer outside 150 mm	2
48.	Odd leg caliper 200 mm	2
49.	Tenon saw	2
50.	Handsaw	2
51.	Morticc chisel	2
52.	Firmer Chisel	2
53.	Mallet medium IS : 2922	2
54.	Jack Plane	2
55.	Pliers combination 200 mm	2
56.	Blow lamp 500 millialitre	2
57.	Pipe opener	1
58.	Washer cutter	1
59.	Pressing stick	1

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1	2	3
63.	Bend bolt	2
64.	Sheet lead knife	2
65.	Chipping knife	2
66.	Mirror 100 × 150 mm	2
67.	Splash stick	2
68.	Soil pot with brush	1
69.	Pot hook	1
70.	Turn pin	1
71.	D.E. spanners 7×8, 10×11, 13×17, 19×22, 24×27 IS : 2028	2 set
72.	Branch gimlets	2
73.	Bending spring	1
74.	Long dumy	2
75.	Short dumy	2
76.	Plumber ladle	2
77.	Joining cramp	2
78.	Plumbers metal melting pot 10 kg.	1
79.	Pipe stocks and dies complete with stocks brushing, bushing holders taps and tap wrenches sizes covered to suit pipes of bore dia 6, 8, 10, 20, 25, 32, 40 and 50 mm	4
80.	Pipe vice to grip pipes up to 77 mm IS : 2587	4
81.	Tool caulking set of 2	2
82.	Stillson pattern pipe wrenches 450 mm to take pipe up to 52 mm dia IS : 4003	2
83.	Stillson pattern pipe wrenches 320 mm to take pipe upto 20 mm to 32 mm.	2 set
84.	Chain pipe wrench 90 mm 650 mm IS : 4223	2
85.	Adjustable spanner A 375 IS : 1649	1
86.	Anvil 50 or 63 kg. IS : 510	1
87.	Pipe bender manually operated	1
88.	Vice leg 75 mm, jaw on stand IS : 2588	1
89.	Hand drill 6 mm capacity with drill chuck	1
90.	Drill twist (straight shank) 3 mm to 6 mm	1

1	2	3
94.	Bath tup	1
95.	Stop tap water 20 mm IS : 781	4
96.	Wash basin (16" × 14" × 10") equivalent metric	2
97.	Water heater 22 litres	1
98.	Water closet (European type with down type cistern)	1 set
99.	Water closet Indian type complete with over head low down cistern	1 set
100.	Urinal wall type complete with automatic system	1 set
101.	Water meter	2
102.	Steel lockers with 8 drawers	2
103.	metal rack 1800 × 1500 × 450 mm	1
104.	Desk	1
105.	Stool	1
106.	Black board with casel	1
107.	Fire extinguisher	1
108.	Fire bucket with sand	1
109.	Steel almirah	1
110.	Katchel break with post ad clamp flat drill 15 to 50 mm by 0.2 mm	1 set
111.	PVC welding plant	1
112.	Electric pump 1 HP	1
113.	D.E. pedestal grinder with two wheels 175 rough and smooth	1
114.	Hydraulic pressure machines for testing leakage in GI pipe fittings etc.	1
115.	Sight rail & bonning rod	1
116.	Ratchet pipe die 15 mm to 32 mm	1
117.	Bench drilling machine with chuck & key up to 15 mm capacity	1
118.	Double face hammers	2
119.	Dormat, Pickle, Spade, Girmale	1 each
120.	Pipe bender (Hydraulic type)	1

Note :

1. No additional items are required to be provided for the batch working in the second shift except the items under trainees Tool Kit and lockers.
2. No additional number of item marked (*) are required to be provided for additional number of batches / units.
3. Items such as sockets elbow U-trap, W-tap pipes etc. required for day to day plumbing work should be purchased from training grant.
4. The specification of the items in the above list have been given in Metric Units and are based on the ISI standards whenever available. While procuring the IST specifications should be strictly followed. Measuring instrument such as steel rule which are graduated both in English and Metric units may be procured, if available.

TRADE - PLUMBER

List of I.S.I. Publications for use of Instructors

1. Pipe wrenches	IS : 4003
2. Pipe vices	IS : 2587
3. Pipe threads for fastening purposes dimensions for	IS : 2643
4. Horizontal centrifugal pumps for clear, cold & fresh water	IS : 1520
5. Gland packing asbestos	IS : 4487
6. Cork composition sheets (part I & II)	IS : 4253
7. Selection installation and maintenance of sanitary appliances, code of practices for	IS : 2064
8. Water meters (domestic type) code of practice for selection installation & maintenance	IS : 2001
9. Water supply in buildings, code of practice for	IS : 2065
10. Caulking lead	IS : 782
11. Enameled steel bath tubs	IS : 3489
12. formulas for water services	IS : 3489
13. Flashing cisterns for water closets and urinals	IS : 774
14. Glazed earthen ware sanitary appliances	IS : 771
15. Pillar taps	IS : 1795
16. Plug cocks for water supply purposes	IS : 3004
17. Sanitary appliances, enameled C.I. general requirements	IS : 772
18. Waste fittings for wash basins & sinks non-ferrous	IS : 2963
19. Water closets, enameled & C.I.	IS : 773
20. Vitreous sanitary appliances (Part-I) general requirements	IS : 2556
21. Bend pipes	IS : 404
22. Zinc	IS : 209
23. Soft Solder	IS : 198
24. Pipes & fittings C.I. rain water	IS : 1230
25. Pressure pipes for water gas and sewage C.I. fittings for	IS : 1538
26. Pipe lines, colour code for the identification of	IS : 2379
27. Lead and its compounds, code of safety for	IS : 4312
28. Excavation work, safety code for	IS : 3764
29. Scaffolds & carders (Part I & II) safety code for	IS : 3696
30. Manhole converse & Games intended for use in drainage work C.I.	IS : 1726
31. Laying C.I. Pipes code of practice for	IS : 3114
32. Laying of concrete pipes code of practice for	IS : 783

SYLLABUS FOR THE TRADE OF PLUMBER UNDER APPRENTICESHIP TRAINING SCHEME (ATS)**Note :**

1. Civil building contractors/civil construction industries / industries which are involved in plumbing related work should employ the apprentices under Apprenticeship Act.

2. The Practical Training Programme of Apprentices under ATS (Apprentices Training Scheme) should be as per the facilities available in the establishment.

3. Question papers are not set on All India basis for final examination at the end of Shop Floor Training and the examination is conducted at establishment level, based on actual on the job training.

Period of Apprenticeship Training : 2 years

The period of training for this trade is Two years consisting of Basic Training for a period of one year & Shop floor training for the remaining period.

For 1st years Training (Basic Training)

1. The content of the syllabus for the apprentices during 1st year training (basic training) should be same as that of the syllabus and tools, equipment, machineries etc. of Craftsmen Training Scheme in the trade of Plumber.
2. Related instruction should be imparted to all apprentices during the entire period of training including Basic training.

Shop Floor Training for 2nd years :

1. The apprentices should have more practice on the Shop Floor in these operations/skills which have been already learnt during the Basic Training and additional operations/skills during the shop floor training and develop method of work, speed, accuracy & finish in jobs.

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**List of operations/skills to be learnt during
Apprenticeship Training**

Sl.No.	Skills
1.	Instruction to safety precautions on the shop floor
2.	Hardening and tempering of chisels
3.	Measurements wire gauge and sheet gauge
4.	Cutting of sheet metal of size
5.	Preparation of sheet metal articles involving development
6.	Forming of rolls, welts corners & slashing in sheet.
7.	Joining of copper & Zinc of solids, hollow & conical roll.
8.	Erection of simple sen folding
9.	Marking for excavation
10.	Cement joining of pipes
11.	Joining of copper tubes : (a) Using can type compression fittings (b) Using ring type commpression fittings. (c) Using capillary fittings.
12.	Butt and branch welds on M.S. pipes.
13.	Bronze welding a. Copper sheet b. Copper tubes c. Brass tubes to copper
14.	Installation meters. a. Gas meter b. Compound meter c. Hot water meter
15.	Joining practice on zinc and copper pipes
16.	Installation of gas piping
17.	Connection of gas meter
18.	Installation of gas appliances
19.	Use, care and maintenance of lifting tackle.
20.	Use of synthetic pipes e.g. polythene etc. and preparation of joints.

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23. Installation of bidet
24. Trouble shooting
25. Joining of cable line

Note : The operations skills market (*) are optional. They must be carried out where facilities are available in the establishments.

Related Instruction (2nd year)

Related instruction should be imparted to all the apprentices during the entire period of training including Basic Training. The syllabus given for Related Instructions should be considered as a guide.

The subjects to be taught to the apprentices in Related Instruction :

1. Trade Theory
2. Workshop Calculation and Science
3. Engineering Drawing
4. Social Studies.

(1) Trade Theory

1. Safety at work accidents do not happen they are caused
2. Revision of previous year's work.
3. Sheet metal Worker's common hand tools – their names and uses, description and uses of simple hand tools used for masonry work. Care and maintenance of tools.
4. Method of joining sheet metal by folding rivetting and soldering.
5. Domestic hot and cold water supply system geysers layout specifications of materials required and connection of pipes to main. Tracing leakages. Repairs to service mains. Domestic required and connection of pipes to main. Training leakages. Repairs to service mains. Domestic boilers and geysers Domestic gas supply system general layout, specifications of materials required. Methods of testing leakage. Repairs to service and main gas supply systems. Water and gas meter their description and use.
6. Domestic drainage system. General layout and specification of materials required. Inspection chambers, air vents anti symphonize

7. Knowledge of carpentry work related to plumbing.
8. Fire hydrants – description and installation.
9. Leak proofing of roof and the junctions with chimney by laying lead sheets etc. Names and parts of roof general principles and metal used for pitched roofs. Roof drainage description of gutters - rain water gutters and pipes.
10. Different types of plumbing system-description and principle of working. Advantages and disadvantages of each system. Regulations, standard specifications and local by laws covering plumbing work.
11. Corrosion and incrustation - prevention of corrosion Corrosion due to electrolytic action. The effects of water and frost on materials.
12. Principles of municipal water supply and distribution system. Principles of municipal sewerage system and its disposal.
13. Application of plastic and synthetic materials in plumbing.
14. Principles of different types of pumps and siphons and their uses in plumbing work.
15. Use of reference tables and manufacturer's hand books.
16. Modern development in the trade new techniques new plumbing materials etc.
17. Quality and finish of work important of quality and finish of job at all stages.
18. Introduction to work simplification job study analysis including planning of sequences of operations. Critical approach and method of working. Estimation of time and material.
19. Water supply theory :
 - (a) Calculating the capacity of a overhead reservoir for workshop / a small village / a small town.
 - (b) Contamination of water in a drinking water well storage reservoir etc.
 - (c) Method adopted for the drawl of water from river bed, a dam, for

21. Drainage :
 - (a) Elevated septic tank collection well, septic tank, sprinklers lamms tank.
 - (b) Imm off tanks.
 - (c) Sewage disposal plants
 - (d) Treatment of sewage
22. Gas supply System :
 - (a) Gas storage tanks
 - (b) Gas supply pipes
 - (c) Valves used in gas supply system tracing out leakage and sequence.
23. Trouble shooting sequence
24. Revision and test
- (2) **Workshop Calculation and Science**
 1. Revision of previous year's work.
 2. Algebra : Addition subtraction, multiplication and division of expressions involving algebraic symbols. Simple equations and transposition problems. Standard algebraic formula e.g. $(a+b)$ $(a-b)$ etc. simple simultaneous equation with two unknown quantities.
 3. Mensuration : Areas of rectangles, squares, triangles, circle and regular polygons, calculation of area, volume and weight of simple solid bodies such as cube spheres hexagonal prisms etc. Problems.
 4. Trigonometry : Trigonometric functions. Use of trigonometric tables, applied problems. Calculation of areas of triangles, polygons etc.
 5. Further problems as applicable to the trade.
 6. Estimation preparation of estimates & specification.
 7. Meaning of tenacity elasticity malleability, brittleness, hardness compressibility & ductility.
 8. Meaning of stress, strain, modulus of elasticity ultimate tensile strength, factor of safety and different types of stresses.
 9. Velocity and acceleration.
 10. Definition of mechanical advantage of simple machines pulleys

13. Determination of diameters, length and weight of pipes. Calculation of requirement of materials for the preparation of estimates. Head of water, water pressure per unit area, rate of flow and volume of water discharged.
14. Description explanation of expansion of solids, liquids and gases due to heat, co-efficient of expansion. Brief description of transference of heat - conduction, convection and radiation.
15. Heat and temperature. Thermometric scales, Fahrenheit and Celsius/centigrade scales, conversion of Fahrenheit to centigrade / Celsius scale and vice-versa. Measurement of temperature. Name and brief description of temperature measuring instruments used in the workshop.

(3) Engineering Drawing

1. Revision of previous year's work
2. Advance blue print reading
3. Code of practice for general engineering drawing according to ISI (IS : 969)
4. Development of surface of simple objects related to the trade.
5. Construction of Isometric scale.
6. Free hand sketching and production of working drawing of simple parts such as pipe joints, taps, valves etc.
7. Free hand sketching and preparation of layout drawings of various plumbing details of buildings.

(4) Social Studies

The syllabus has already been approved and is same for all the trades.