

Syllabus for the subject
of

**TRADE THEORY-I
&
TRADE PRACTICAL-I**

Under
Craft Instructor Training Scheme (CITS)

PLUMBER TRADE

Redesigned in

2014

By

Government of India
Ministry of Labour & Employment
Directorate General of Employment & Training
(DGE&T)

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A. RATIONALE

Success & Sustainability of any Training System depends upon given other things, availability of good quality instructors. An Instructor should possess good trade skills to impart skill training. To cope up this quality possession of trade skills is imperative.

Ability to understand and interpret the course content is essential to perform a job / task of Engineering Trades. It is the skills, Knowledge and Attitude which enables comprehending the given job and subsequent planning to complete the task/job. Thus it is imperative for any trade to instructor to have skill so that same can be transferred.

For an instructor it is essential to have in depth knowledge set which enables analyzing the given job and subsequent detail planning. To transfer skill the practical know how is most important criteria as in ITI system skill is the ultimate requirement. To perform a task/job both theoretical and practical knowledge are very much needed. Thus Trade Technology is regarded as basic/hard skills which are base of all skill based training.

Recognizing this importance maximum weight age has been given to the Trade Technology in all Engineering Trades in Craft Instructors Training Scheme (CITS) under NCVT.

B. GENERAL INFORMATION

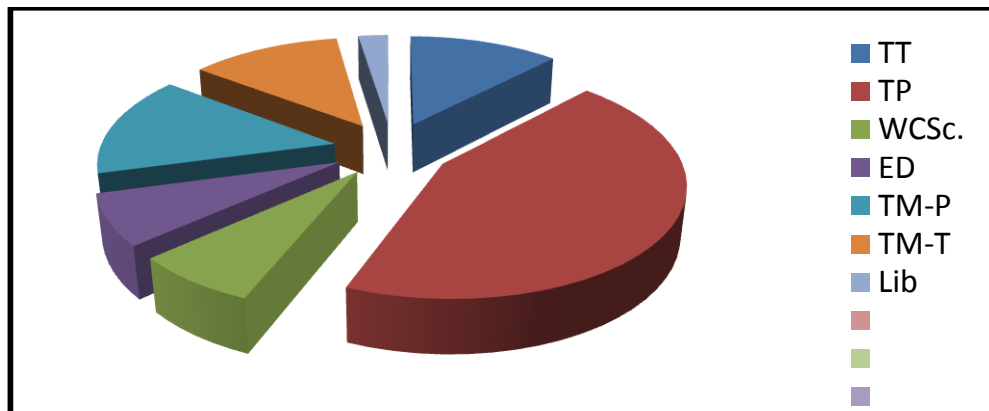
1	Name of the Course	Craft Instructor Training
2	Duration of Instructor Training	1 Year (Two semesters each of six months duration).
3	Subjects covered in the Semesters	Detailed in Section - C
4	Name of the Subject	TRADE THEORY –I & TRADE PRACTICAL-I
5	Applicability	PLUMBER Trade
6	Entry Qualification	NTC /NAC in the Plumber trade OR Diploma i/ Degree in Mechanical or Civil Engineering from AICTE recognized Board / University
7	Unit Strength (Batch Size)	20 Trainees
8	Examination	AITT to be held at the end of each semester
9	Space Norms	a) Class room: 30 sqm. Area having Minimum width of 5 m.and with 6000 lumen b) Workshop: 120 sqm. meter having minimum width of 8 m. and with 30000 lumen The electrical equipments of Class room should conform to minimum 3 star Building energy rating as per Bureau of Energy Efficiency (B.E.E.)
10	Power Norms	a) Class room: 1kw(6000 lumen) b) Workshop : 15 kw
11	Trainer's Qualification	Degree or Diploma in Civil / Mechanical branch of engineering from AICTE recognized University / Board with Five or Two years post qualification experience respectively. In case of two units, one trainer must be Degree in Engineering
12	Desirable Qualification:	Passed National Craft Instructor Training course in same OR relevant trade.

C. SEMESTER WISE ALLOTMENT OF TIME & MARKS AMONG THE SUBJECTS FOR CITS

	SUBJECTS	Hrs. / Week	% of time allotted	Marks	Sessional	Full Marks	Pass Marks		
							Exam.	Sessional	Total
First semester	Trade Practical – 1	20	50	200	30	230	120	18	138
	Trade Theory - 1	6	15	100	20	120	60	12	72
	Workshop Cal. & Sc.	6	15	50	-	50	30	-	30
	Engineering Drawing	6	15	100	-	100	60	-	60
	Library	2	5	-	-				
	TOTAL for Sem. - I	40		450	50	500	270	30	300
Second semester	Trade Practical – 2	16	40	200	30	230	120	18	138
	Trade Theory - 2	4	10	100	20	120	60	12	72
	Training Methodology - Practical	12	30	200	30	230	120	18	138
	Training Methodology - Theory + IT	6+2	20	100	20	120	60	12	72
	TOTAL	40		600	100	700	360	60	420
	GRAND TOTAL	80		1050	150	1200	630	90	720

Hourly Distribution

TOTAL: 1200 marks for 2 semesters Pass marks: 720



Subject	Time in %	Marks in %
Trade Practical	45	38
Trade Theory	12.5	20
Total for Trade	57.5	58
Training Methodology (Practical)	15	19
Training Methodology (Theory) + IT	12.5	10
Total for Training Methodology & IT	27.5	29
Engineering Drawing	7.5	12
Workshop Cal. & Sc.	7.5	4
Library	2.5	-

D. Syllabus for the Trade of Plumber under CITS

First Semester

Duration: Six Months (26 WEEKS)

Achievement of TP 01 and TT 01

At the end of the semester I the trainee shall be able to do :

- Safety rules, first aid, and the uses of safety appliances.
- Uses of fitters hand tools , locking device and fastening devices.
- Reading of plumbing drawings
- Made threading and taping of pipes, fitting of pipes.
- Uses of carpenters hand tools, and made simple joints.
- Prepare joints by welding Gas, Arc, and P.V.C.
- Application, Care and Maintenance of plumbers hand tools.
- Application, Care and Maintenance of Masonry hand tools, to prepare mortar, inspection chambers and gully trap.
- Cutting of various pipes at different angles, made a simple joints using pipes accessories and valves.
- C.I .pipe joints using Lead
- Bending of pipes and tubes
- Installation of electric pumps.
- Branching of pipes, leakage testing and alignment tests.
- Fixing and repairing of water, steam cocks and valves.
- Testing of water by ph meter.
- Measuring, preparation and fixing of rising mains.
- Preparation and fixing of Hot and Cold services.
- Fixing of Floor trap, wash basin, sink, tub, etc.
- Erection of rain water, drainage piping system
- Installation, Testing, Trouble shooting of Drainage lines / sanitary systems.

Syllabus for the Trade of Plumber under CITS

First Semester

Duration: Six Months (26 WEEKS)

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 Marking, filing, drilling hole. practice on cutting threads (internal and external) by using of Dies and Taps	Fitter's hand tools, Types of files, drills and machines. Dies and Taps, Description of pipe dies Taps, their uses, care & precaution. selection of Dies and Taps	2 week
3.	4	uses of Carpenter's hand tools	Description of Carpenter's hand tools	1 week
4.	5& 6	Practice of gas & Arc welding PVC welding Practice on soldering. Practice on brazing.	Gas & Arc welding Hot gas welding, Electric heat welding, Types of Fluxes-uses, hard and soft solders .	2week
5.	7	Reading of plumbing drawings. Use and care of the plumber's hand tools and equipments.	Descriptions of the plumber's tools and equipments.	1 week
6.	8	Use of common masonry hand tools, Construction of gully and inspection chambers.	Mason hand tools, materials, types of bonds and plastering, mortars, concrete. Types of traps Describe gully trap , man holes	1 week
7.	9	Joining of pipes,	Description of Plumbing	1 week

		Fixing of different pipe & pipe accessories.	Materials (Pipes and other accessories) Description of various pipe joints. Type of joints used for Different materials.	
8.	10	Use & fixing of P.V.C. pipe fittings.	Description of Plumber's Materials (PVC Pipes and accessories for joining	1 week
9.	11 & 12	Bending and shaping of different pipes	Bending machine and method of bending. Method of bending pipes by hot and cold process	1 week
10.	13 & 14	Installation of electric pumps Centrifugal, reciprocating ,submersible pumps etc)	Basic knowledge about the electrical connection of pumps Description – types-application –care & maintenance of pumps	2week
11.	15 & 16	Erecting simple water supply system, water meter	Description & types of water supply system, sources of water, composition of water Inspection and testing of water supply system.	2week
12	17	Fixing of different water, gas and Steam cocks, valves and other pipe accessories.	Description of cocks & Valves-their types, purpose materials, specification,	1 week
13	18	Water distribution system Measurement, cutting, preparation and fixing up of rising mains and distributing pipes	Method of laying out pipes alignment and joining, Air lock in pipes and its removal, water hammer	1week
13	19	Preparation and fixing up wash basin , bathtubs, sinks and traps	Domestic drainage System Describe- types –material application –specification of wash basin, bathtubs, sinks, and traps.	1week
14	20 & 21	Erection of water closets and urinals	Describe- types –material application –specification of water closets and urinals	1week
15	22	In -plant training		1 week
16	23 &24	Projects		2weeks
17	25	Revision		1 week
18	26	Final Examination		1 week

REVISED SYLLABUS FOR THE TRADE: PLUMBER

CRAFT INSTRUCTOR TRAINING SCHEME

Note: During the discussion of any machine tools, related precautions and safety measures should be discussed.

Trade Practical				Trade Theory		
Week No.	Topics	Hours	Marks	Topics	Hours	Marks
1	<p>INTRODUCTION OF TRAINING:</p> <p>Familiarization with the institute.</p> <p>Importance of trade training. -Machinery used in the type of work done by trainees in the institute.</p> <p>Type of jobs made by the trainees in the trade.</p> <p>Introduction to safety:</p> <p>Equipment including SAFETY & fire fighting and their uses.</p>	06	05	<p>Importance of safety and general precautions required for the trade.</p> <p>Importance of the trade.</p> <p>Types of work to be done by trainees in the institute.</p> <p>Scope of a plumbing work.</p> <p>Types of services have to plan.</p> <p>Basic Bench fitting</p>	20	05
2	<p>Use of steel rules, try Square, Scriber and dividers for marking out from drawing.</p> <p>Use of hacksaw, centre punch, Marking, filing, drilling holes and sawing.</p> <p>Making of studs and bolts.</p> <p>Different types of Files & filing to line.</p>	06	10	<p>Fitter's common hand tools - names, description and Material from which they are made.</p> <p>Description, types and uses of holding device , hammers & cold chisels, cutting tools</p> <p>Description of simple fitting operations hack sawing, punching and filing.</p> <p>Types of files used commonly.</p>	20	05

	<p>Filing a job flat and square.</p> <p>Use of various locking devices. Fastening devices.</p> <p>Practicing chipping operation, Grinding of chisels. Cold chisel, round nose chisel.</p>			<p>Marking instruments and their use.</p> <p>Description of different types of Locking and fastening devices.</p>		
3	<p>Threading pipe of various sizes.</p> <p>Fixing of different fittings.</p> <p>Marking for drilling holes,</p> <p>Drilling, tapping and threading on pipes.</p>	06	10	<p>Standard pipe threads.</p> <p>Description of simple drilling machine.</p> <p>Method of using drills taps and dies.</p> <p>Description of simple bench drilling Machine.</p>	20	05
4	<p>Demonstration and uses of Carpenter's hand tools involving sawing, planing, chiseling and making simple joints</p>	06	05	<p>Description and uses of Carpenter's hand tools used for simple operations such as marking, sawing, planing and making simple joints.</p> <p>Common types of wood- their description and use.</p>	20	05
5 &6	<p>Practice of gas & arc welding:</p> <p>Joining of pipes of different diameters and thickness by</p>	12	20	<p>Gas & Arc welding :</p> <p>Purpose of gas and Arc welding</p> <p>Method of gas & arc welding,</p>	40	10

	<p>GAS & Arc welding.</p> <p>Simple repair work by welding. Practice in soldering and brazing of simple jobs.</p> <p>PVC welding</p> <p>PPR pipe welding joint</p>			<p>Equipments and tools for hot gas welding and electric hot plate for PPR pipe joints</p> <p>Safety precautions to be observed Methods of soldering and brazing – & Types of fluxes uses</p> <p>Description of Plumber's materials Lead, tin, Zinc, solder, copper, red lead etc. and their uses.</p> <p>Hard & soft solders –their properties, composition and uses.</p>		
7	<p>Use and care of the plumber's tools and equipments.</p> <p>Cutting of pipes of different metals of different dimensions and sizes.</p>	06	10	<p>Identify plumbing services required for each type of building according to usage.</p> <p>Description of plumber tools and Equipments- ratchet, brace, threading die, pipe wrench, sliding wrench, spanner set, chain Wrench etc. and their safety.</p> <p>Care & use of tools.</p>	20	05
8	<p>Use of mason hand tools :</p> <p>Straight edge spirit level, plumb bob, square, etc.</p> <p>Setting out work with tape, rule, square, line pin, and level.</p> <p>Cutting bricks and stones to given size and template.</p> <p>Preparation of lime & cement mortars in</p>	06	10	<p>Masons hand tools:</p> <p>Names, description and their uses. -Method of making holes in walls and Floors.</p> <p>Types of tools used and various Processes.</p> <p>Concept of bricks, lime and cement.</p> <p>Preparation of mortars with various materials of varying composition.</p>	20	05

	<p>different proportions to suit various purposes.</p> <p>Elementary brick wall work such as construction of gully trap, inspection chamber & manhole of any convenient size.</p> <p>Forming, benching and channeling the plastering of walls.</p> <p>Cutting of wall with electric cutting tools</p>			<p>Common brick joints.</p> <p>Description of bonds.</p> <p>Scaffolding & plastering.</p> <p>Method of construction of manhole etc.</p> <p>Plain cement concrete, RCC and its proportion, grades of coarse aggregate and fine aggregate,</p> <p>Define-concrete with cement mortar and lime mortar.</p> <p>Knowledge of waterproofing compound</p>		
9	<p>Practice on cutting pipe at different angles in different materials and diameters by using various fittings.</p> <p>Fixing of different pipe accessories such as bends, flanges, tees, elbows, sockets, cocks and valves.</p> <p>Making of simple joints for Different purposes of using above.</p> <p>Socket joint of cast iron pipes with lead.</p>	06	10	<p>Different types of pipes- GI, C.I, PVC/CPVC, PPR, AC and HDPE etc.</p> <p>Describe the pipe fittings GI, C.I, PVC/CPVC, PPR, AC and HDPE etc.</p> <p>Methods of joining and their uses.</p> <p>Precautions to be taken while fixing.</p>	20	05
10	<p>Layout of P.V.C. pipe according to drawing</p> <p>Practice on cutting & shaping P.V.C .pipes as per lay out.</p>	06	10	<p>Importance of Layout in domestic</p> <p>Plumbing Symbols and coding practice</p> <p>Describe the pipe dies, their uses, care and precaution.</p> <p>P.V.C. Description, Properties & use in plumbing</p>	20	05

	Use & fixing of P.V.C. pipe fittings. Method of laying out PVC pipe.			work ,PVC Pipe fitting –bends, elbows, sockets, tees, unions etc. Their description, specification and use Metric specification of various pipes. Standard pipe threads. Method of Joining and fixing PVC pipe. Joining material for water and gas piping system		
11& 12	Different methods of Bending by various pipes and tubes Bending of copper tubes of light gauges. Bending of Pipes& tubes (mild steel , G.I , Copper, and PVC)	12	20	Describe bending machine –types –working principle –application- Method of bending pipes by hot and cold process. Method of bending heavy & light pipe and tubes. Use of blow lamp. Defects, causes & remedies of bending.	40	10
13 &14	Installation of electric pumps (Centrifugal, reciprocating, submersible pumps, etc.)	12	20	Description, identify the parts of pumps types, and their uses (Centrifugal pump, reciprocating, submersible pumps, etc.) Application –care & maintenance of pumps	40	05
15 &16	Branching of pipes. Installation and testing of simple water supply system including of water meter.	12	20	Describe water meter –types, working principle-application, merit, specification. Laying of Branches of piping system Inspection and testing of water supply system. General points to be observed when choosing water supply system	40	10

17	<p>Practice on fixing of different water, gas and steam cocks and valves,</p> <p>Repairing practice of cocks and valves,</p> <p>Including renewal of packing, washer, gasket, spindle etc.</p> <p>Testing of water by ph meter</p>	06	10	<p>Description of cocks & valves-their types, Application ,working principle, materials & advantages, specification as per IS:</p> <p>Sources of water</p> <p>Composition of water:</p> <p>Hard & Soft water, temporary hardness & permanent hardness. Action of water on lead-water softness –tests for water.</p> <p>Water purification stages and methods</p> <p>Impurities of water – organic and inorganic impurities</p>	20	05
18	<p>Water distribution system.</p> <p>Measurement, preparation and fixing up of rising mains.</p> <p>Preparation and fixing of hot and cold services to the bath and wash basin as per layout.</p> <p>Installation of hot water system(Electric water heating system)</p>	06	10	<p>Water supply system of a small town. . Storage tanks for general water supply purpose,</p> <p>Static water pressures and measurement of pressures.</p> <p>Bursting pressure,</p> <p>Expansion of water on freezing and heating Bernoulli's principles</p> <p>Pascal's law</p> <p>Pressure of water on the sides of cistern or tank.</p> <p>Water hammer in pipes.</p> <p>Water distribution system, method of distribution</p> <p>Electric water heating system</p>	20	05
19	Fixing of floor traps in kitchen and bath.	06	10	Description of sanitary fittings (bath tub,	20	05

	Fixing of Bath tub, wash basin , sink etc Trouble shooting of sanitary system Testing of drainage lines smoke test, water test, smell test, ball test, mirror test.			floor traps , kitchen sink , wash basin etc Trouble shooting of sanitary system Testing of drainage lines smoke test, water test, smell test, ball test, mirror test.		
20	Trouble shooting of sanitary system Testing of drainage lines smoke test, water test, smell test, ball test, mirror test.	06	10	Trouble shooting of sanitary system Testing of drainage lines smoke test, water test, smell test, ball test, mirror test.	20	05
21	Erecting rain water and drainage piping system Installation of sanitary fittings like water closets & urinals.	06	10	Erecting rain water and drainage pipe system, Description of sanitary fittings, types application, specification of water closets & urinals General points to be observed when selection of sanitary fittings.	20	05
22	In- plant Training				40	
23-24	Project					
25	Revision					
26	Final Trade Test					

E. List of Tools & Equipment
For a batch of 20 Trainees for the trade of - Plumber

Under CITS

I. TRAINEES TOOL KIT FOR 20 TRAINEES AND A TRAINER

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 peen 800 grams	21 Nos.
8.	Hammer ball peen 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.	Still son 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.

II. General 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	Universal Scribing Block 300 mm	5nos.
6	Hand Vice Jaw 50 mm	5nos.
7	File Flat Smooth 200 mm	10nos.
8	File Half Round Rough 300 mm	10nos.
9	File Square rough 250 mm	10nos.
10	File Square Smooth 200 mm	10nos.
11	File Triangular Rough 250 mm	10nos.
12	File Flat Rasp 250 mm	10nos.
13	File Triangular Smooth 200 mm	10nos.
14	Chisel Cold Flat 20 mmX300mm	10nos.
15	Chisel Cross Cut 6X150 mm I S-402	10nos.
16	Chisel Round Nose 3X150 mm I S -402	10nos.
17	Chisel Diamond Point 6X150mm	10nos.
18	Tap and tap wrench to cut B.S.F. , B.S.W. (Metric threads of sizes No.M6 to M-12 and British thread ¼" to 1½")	5 set each
19	Screw Pitch gauge to cover above threads	5set
20	Letter Punch 8mm	1no.
21	Number Punch 8mm	1no.
22	Hand hacksaw frame 300mm	10 Nos.
23	Spanner monkey up to 50mm	5Nos.
24	Stove melting (solder Iron and bit)	5Nos
25	Pipe Cutter wheel type 6mm to 25mm	5 Nos.
26	Oil stone 150X50X25mm	2 Nos.
27	Soldering Iron , Copper , Bit , Fire heated , Hatched , Straight , 500 grams	4 Nos.
28	Snip Straight 250mm	5 Nos.
29	Snip bend 250mm	5 Nos.
30	Try square 200mm	5 Nos.
31	Inside Calliper 150mm	10 Nos.
32	Caliper outside 150mm	10 Nos.
33	Odd leg calliper 200mm	10 Nos.
34	Tenon saw	5 Nos.
35	Hand Saw	5 Nos.
36	Mortise Chisel 6mm, 8mm, 10mm, 12mm ,15mm, 25mm	Each 5 Sets
37	Firmer Chisel	5 Sets.
38	Mallet Medium IS: 2922	10 Nos.

39	Jack plane	10 Nos.
40	Gas Welding set with oxygen acetylene cylinder	1 No.
41	Table welding 1200X 750 mm with fire bricks top and stand	1 NO.
42	Combination Pliers 200 mm	10 Nos.
43	Blow lamp 500 millilitre	5Nos.
44	Washer cutter (Hollow punch 6mm to 30mm)	Each 2set.
45	Scribing gauge	5 No.
46	Soil pot with brush	1 No.
47	Pot- Hook	3 No.
48	D. E. Spanners 6mm to 32mm IS:2028	Each 2 Sets
49	Branch Gimlets	2 Nos.
50	Bending Spring	2 Set
51	Plumbers Ladle	2nos
52	Caulking Tool (set of 5nos.)	2 Set
53	Plumbers' metal melting pot 10 kg	1 no.
54	Pipe Die and Die stock (¼" to 2½") with complete set	4 sets
55	Pipe vice up to 75 mm IS -2587	8 nos.
56	Still son pattern pipe wrenches 450 mm IS -4003	10sets
57	Still son pattern pipe wrenches 300mm	10sets
58	Chain pipe wrench 90mm -650 is 4123	2sets
59	Adjustable spanner12" IS- 6149	10nos
60	Anvil 50 or 63 kg. IS- 510	1no
61	Pipe bender manually operated	2no
62	Leg vice 75mm jaw with Stand IS -2588	1no
63	Hand drill machine up to 13mm capacity with drill chuck (Electric)	1no
64	Drill Twist (straight shank) 1.5mm to 13mm	Each 3set
65	Portable forge 450mmwith hand blower	1no
66	Smithy tong different shapes	Each 2nos.
67	working bench 2400x1200x750mm with 4 voice 125 mm jaws	5nos.
68	Bath tub small size	2no.
69	Wash Basin (16"X14"X10")Equivalent metric	5nos.
70	Water Heater 10 litres	5nos.
71	Water closet (European type p) complete with over head cistern	2set
72	Water closet (Indian type) complete with over head cistern	2set
73	Urinal wall type complete with automatic system	1set
74	Water meter	5nos.
75	Black Board with glass	2nos.
76	Fire Extinguisher (CO ₂ and DCP)	Each1no
77	Fire Buckets with stand	2nos.
78	Hammering drilling machine (6mm to 32mm) with drill bit	Each 2nos.
79	Electric PPR pipe welding machine	1 No
80	Electric pump, 1 HP ((Centrifugal, reciprocating, submersible pumps, etc.)	1 no.
81	Pedestalgrindermachine	1 No.
82	Hydraulic pressure machine for testing leakage in pipe fittings etc.	1No.
83	Sight rail and boning rod	1 No.
84	Ratchet pipe die set 15 mm to 32 mm	1 No.

85	Bench drilling machine with chuck up to 25mm capacity	1 No.
86	Double face hammers	2 No.
87	Dormant, Pickaxe, Spade, Grimace	1 each
88	Pipe bender(Hydraulic type)	1 No.
89	Ring spanner set 6mm to 32mm	2 set
90	Solar water heater system	1No
91	Solar cooker	1No

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

F. FURNITURE, ACCESSORIES AND AUDIO VISUAL AIDS FOR
Trade Theory-I AND Trade Practical-I (COMMON FOR ALL ENGG. TRADES)

SL. No.	Name of the tools and equipment	Qty per unit
01	Class Room Chairs (armless) / Dual desk may also be allowed	20 /10
02	Class Room Tables (3ft X 2ft) / Dual desk may also be allowed	20 /10
03	Chair for Trainer (armed) movable	01
04	Table for Trainer (4 ½ ft X 2 ½ ft) with Drawer and cupboard	01
05	LCD / LED Projector	01
06	Multimedia Computer System with all accessories with UPS (.5 KVA)	01 set
07	Computer Table	01
08	White Board (6ft X 4 ft.)	01 no.
09	LCD Projector Screen	
10	Air Conditioner 1.5Ton (OPTIONAL)	02
11	Wall Clock	01 no.
12	Wall charts, Transparencies and DVDs related to the trade	As required

G. LIST OF TRADE COMMITTEE MEMBERS

Sl. No.	Name & Designation Sh./Mr./Ms.	Organization
1.	Prof. Nirjhar Dhang. (H.O.D)	Dept. of Civil Engg. IIT Kharagpur
2.	Col. N. B. Saxena.	Construction Skill Development Council of India (CSDCI)
3.	Satish Gottipati. (M. D.)	Preca Solutions (E)

4.	Meena Raghunathan. (Director, Community Science.)	GMRU Foundation, Hyderabad.
5.	D. K. Chattopadhyay. (Training Officer.)	ATI, Kolkata. Dasnagar, Howrah.
6.	S. R. Vhatkar. (Training Officer.)	ATI, Kolkata. Dasnagar, Howrah.
7.	A. K. Naskar. (Training Officer.)	ATI, Kolkata. Dasnagar, Howrah.
8.	S. Chockalingam. (Training Officer.)	CTI, Chennai,
9.	Tapan Kr. Halder. (Training Officer.)	RDAT, Kanpur.
10.	Arpana Singh. (T.O.)	N.V.T.I (W) Noida.
11.	P. Karithashankar. (T. O.)	N.V.T.I (W) Noida.
12.	Simni. (T. O.)	N.V.T.I (W) Noida.
13.	Suman Kumari. (T. O.)	N.V.T.I (W) Noida.

Syllabus for the subject
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**TRADE THEORY-II
&
TRADE PRACTICAL-II**

Under
Craft Instructor Training Scheme (CITS)

PLUMBER TRADE

Redesigned in

2014

By

Government of India
Ministry of Labour & Employment
Directorate General of Employment & Training
(DGE&T)

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B. RATIONALE

Success & Sustainability of any Training System depends upon given other things, availability of good quality instructors. An Instructor should possess good trade skills to impart skill training. To cope up this quality possession of trade skills is imperative.

Ability to understand and interpret the course content is essential to perform a job / task of Engineering Trades. It is the skills, Knowledge and Attitude which enables comprehending the given job and subsequent planning to complete the task/job. Thus it is imperative for any trade to instructor to have skill so that same can be transferred.

For an instructor it is essential to have in depth knowledge set which enables analyzing the given job and subsequent detail planning. To transfer skill the practical know how is most important criteria as in ITI system skill is the ultimate requirement. To perform a task/job both theoretical and practical knowledge are very much needed. Thus Trade Technology is regarded as basic/hard skills which are base of all skill based training.

Recognizing this importance maximum weight age has been given to the Trade Technology in all Engineering Trades in Craft Instructors Training Scheme (CITS) under NCVT.

B. GENERAL INFORMATION

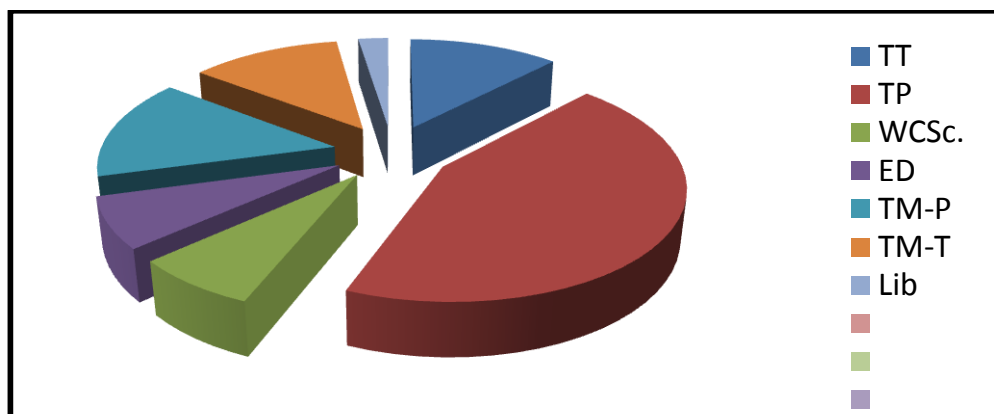
1	Name of the Course	Craft Instructor Training
2	Duration of Instructor Training	1 Year (Two semesters each of six months duration).
3	Subjects covered in the Semesters	Detailed in Section - C
4	Name of the Subject	TRADE THEORY –II & TRADE PRACTICAL- II
5	Applicability	PLUMBER Trade
6	Entry Qualification	Completed Semester – I of Plumber trade under CITS OR Diploma i/ Degree Mechanical or Civil Engineering from AICTE recognized Board / University
7	Unit Strength (Batch Size)	20 Trainees
8	Examination	AITT to be held at the end of each semester
9	Space Norms	a) Class room: 30 sqm. Area having Minimum width of 5 m.and with 6000 lumen b) Workshop: 120 sqm. meter having minimum width of 8 m. and with 30000 lumen The electrical equipments of Class room should conform to minimum 3 star Building energy rating as per Bureau of Energy Efficiency (B.E.E.)
10	Power Norms	a) Class room: 1kw b) Workshop : 15 kw
11	Trainer's Qualification	Degree or Diploma in Civil / Mechanical branch of engineering from AICTE recognized University / Board with Five or Two years post qualification experience respectively. In case of two units, one trainer must be Degree in Engineering
12	Desirable Qualification:	Passed National Craft Instructor Training course in same OR relevant trade.

E. SEMESTER WISE ALLOTMENT OF TIME & MARKS AMONG THE SUBJECTS FOR CITS

	SUBJECTS	Hrs. / Week	% of time allotted	Marks	Sessional	Full Marks	Pass Marks		
							Exam.	Sessional	Total
First semester	Trade Practical – 1	20	50	200	30	230	120	18	138
	Trade Theory - 1	6	15	100	20	120	60	12	72
	Workshop Cal. & Sc.	6	15	50	-	50	30	-	30
	Engineering Drawing	6	15	100	-	100	60	-	60
	Library	2	5	-	-				
	TOTAL for Sem. - I	40		450	50	500	270	30	300
Second semester	Trade Practical – 2	16	40	200	30	230	120	18	138
	Trade Theory - 2	4	10	100	20	120	60	12	72
	Training Methodology - Practical	12	30	200	30	230	120	18	138
	Training Methodology - Theory + IT	6+2	20	100	20	120	60	12	72
	TOTAL	40		600	100	700	360	60	420
	GRAND TOTAL	80		1050	150	1200	630	90	720

Hourly Distribution

TOTAL: 1200 marks for 2 semesters Pass marks: 720



Subject	Time in %	Marks in %
Trade Practical	45	38
Trade Theory	12.5	20
Total for Trade	57.5	58
Training Methodology (Practical)	15	19
Training Methodology (Theory) + IT	12.5	10
Total for Training Methodology & IT	27.5	29
Engineering Drawing	7.5	12
Workshop Cal. & Sc.	7.5	4
Library	2.5	-

F. Syllabus for the Trade of Plumber under CITS

Second Semester

Duration: Six Months (26 WEEKS)

Achievement of TP 02 and TT 02

At the end of the semester: II the trainee shall be able to do :

- **Identify the piping line by Colour coding**
- **Found the leakages and repairing of water supply system, drainage (domestic and Industrial**
- **Removal of air locks in the pipe lining systems.**
- **Laying of AC pipes and joining them.**
- **Construction of Inspection chamber, Man hole, gully trap.**
- **Erection of rain water harvesting system, Gutter Out let, grounding the pipes.**
- **Install water Heater (Electric and solar) and sensors systems.**
- **Reconditioning of Taps, valves, and flushing tanks.**
- **Assembly, dismantling and repairing of all types of pump.**
- **Cleaning and maintenance of Over head tanks and sumps.**
- **Installation of Fire systems, hydrants and sprinklers.**
- **Pressure testing of Piping system by hydraulic.**
- **Draw a plumbing Drawing By 2D CAD**
- **Transfer knowledge**

Syllabus for the Trade of Plumber under CITS

Second Semester

Duration: Six Months

Syllabus for the Trade of Plumber under CITS
Syllabus for TP 02 and TT 02

Week No.	Trade Practical	Trade Theory
1	Tracing out different pipe line system, found leakages and repairing of water supply system.	Methods of tracing out the leakages in water supply system (hydraulic gradient lines, sounding rod, Direct observation etc) Leaks in pipes and noises in plumbing.
2	Removal of air locks.	Causes and remedies of Air locks in pipe and pipe fittings
3	Laying out of hummed and asbestos pipes -according to drawing alignment of pipes and joining them Repair of leaks in joints.	Use of hummed and asbestos pipes of different sizes. Method of laying out pipes alignment and joining.
4	Constructions of inspection chamber.	Inspection chamber and septic tank, Layout of drainage system , types ,application, specification ,IS Code
5	Constructions of manholes, gully traps.	Description of drains, chess pools, soaks pits etc. Traps-types and their uses ,applications, specification , IS Code
6	Fixing of external soil pipe with sand branch fitted to take soil pipe from W.C.	Describe the soil pipe, types, materials, Fittings, joints, specification, Application, Testing. Uses of Air vent, etc.
7	Preparation of fixing of sink waste, wash basin and bath wastes.	Selection of waste and drain pipes and fittings , Specification

	Testing of drainage lines smoke test, water test , smell test, ball test ,mirror test.	Method of testing drainage pipe lines
8	Testing drainage pipe lines (domestic) Fixing, testing & repair of Bath tub, wash basin etc.	Describe the testing of drainage lines, methods and application. Fixing of ventilating pipe. Precaution against air Poisoning
9	Installation of Rain water harvesting system	Describe the Rain water harvesting system, types, methods, application, Care and maintenance.
10	Fixing of rain water gutter, outlet and grounding pipe.	Describe rain water gutter, outlet and grounding pipe, Accessories Care and maintainance.
11	Reconditioning of taps and valves, (practice including renewal of packing, washer, gasket etc.) Reconditioning of flushing tank.	Method of dismantling and renewal of the taps and valves Spares for particular work. Describe ,types , parts and function, constructional features of flushing tank.
12	Installation of solar water heater Preparation and fixing of hot and cold services to the bath and wash basin as per layout.	Concept of heat and temperature. Method of transmission of heat. Heating system by different thermal units. Description of Domestic solar water heater and cooker General layout, specification of materials required for Domestic boilers and Geysers.
13	Assembly and disassembly of different type of pumps. (Centrifugal, reciprocating, submersible pumps, etc.)	Preventive maintenance of all types of pumps. Calculation of head of pumps.
14	Repair of different types of pumps.	Suction limitation of pumps , defects in pumping, causes and remedies of pumping
15	Cleaning and maintenance of over head tanks and sumps.	Precautions to be taken before entering the tanks and sumps.
16	Repairing of waste out let of wash basin , sink, tub with putty and washer Fixing sensor system	Causes and remedies of blockages. Sensor system for urinals and was basin, describe, types, specifications and materials required for the sensor system
17	Pressure test using hydraulic pressure testing machine.	Describe pressure test, equipments, types, method , calculation of pressure , application
18	Repair of leakages of sanitary system	Trouble shooting of leakage testing of sanitary systems.

19	Scraping and painting of pipes.	Plumbing symbols and plumbing colour codes Corrosion - causes and remedies, Prevention, Corrosion due to electrolytic action.
20	Installation of Fire main systems ,hydrants & Sprinklers,	Describe, types, functioning, Specification, of Fire main systems, hydrants & Sprinklers.
21	Practice of 2D CAD Commands and preparing of drawing of pipe line systems	Introduction of Auto CAD for Plumbing <ul style="list-style-type: none"> • Features of Auto CAD • 2D CAD Commands • Applications for Creating Drawing Methods of Developing the CAD drawings.
22	In- plant Training	
23-24	Project	
25	Revision	
26	Final Trade Test	

REVISED SYLLABUS FOR THE TRADE: PLUMBER

CRAFT INSTRUCTOR TRAINING SCHEME

Note: During the discussion of any machine tools, related precautions and safety measures should be discussed.

Trade Practical				Trade Theory		
Sl. No.	Topics	Hours	Marks	Topics	Hours	Marks
1	Tracing out different pipe line system, found leakages and repairing of water supply system.	04	05	Methods of tracing out the leakages in water supply system (hydraulic gradient lines, sounding rod, Direct observation etc) Leaks in pipes and noises in plumbing.	16	05
2	Removal of air locks.	04	05	Causes and remedies of Air locks in pipe and pipe fittings	16	05
3	Laying out of hummed and asbestos pipes -according to drawing alignment of pipes and	04	10	Use of hummed and asbestos pipes of different sizes. Method of laying out pipes alignment	16	05

	joining them Repair of leaks in joints.			and joining.		
4	Constructions of inspection chamber.	04	10	Inspection chamber and septic tank, Layout of drainage system , types ,application, specification ,IS Code	16	05
5	Constructions of manholes, gully traps.	04	10	Description of drains, chess pools, soaks pits etc. Traps-types and their uses ,applications, specification , IS Code	16	05
6	Fixing of external soil pipe with sand branch fitted to take soil pipe from W.C.	04	10	Describe the soil pipe, types, materials, Fittings, joints, specification, Application, Testing. Uses of Air vent, etc.	16	05
7	Preparation of fixing of sink waste, wash basin and bath wastes. Testing of drainage lines smoke test, water test , smell test, ball test ,mirror test.	04	10	Selection of waste and drain pipes and fittings , Specification Method of testing drainage pipe lines	16	05
8	Testing drainage pipe lines (domestic)	04	10	Describe the testing of drainage lines, methods and application.	16	05

	Fixing, testing & repair of Bath tub, wash basin etc.			Fixing of ventilating pipe. Precaution against air Poisoning		
9	Installation of Rain water harvesting system	04	10	Describe the Rain water harvesting system, types, methods, application, Care and maintenance.	16	05
10	Fixing of rain water gutter, outlet and grounding pipe.	04	10	Describe rain water gutter, outlet and grounding pipe, Accessories Care and maintaianance.	16	05
11	Reconditioning of taps and valves, (Practice including renewal of packing, washer, gasket etc.) Reconditioning of flushing tank.	04	10	Method of dismantling and renewal of the taps and valves Spares for particular work. Describe ,types , parts and function, constructional features of flushing tank	16	05
12	Installation of solar water heater Preparation and fixing of hot and cold services to the bath and wash basin as per layout.	04	10	Concept of heat and temperature. Method of transmission of heat. Heating system by different thermal units. Description of Domestic solar water heater and cooker General layout, specification of materials required for Domestic	16	05

				boilers and Geysers.		
13	Assembly and disassembly of different type of pumps. (Centrifugal, reciprocating, submersible pumps, etc.)	04	15	Preventive maintenance of all types of pumps. Calculation of head of pumps.	16	05
14	Repair of different types of pumps.	04	10	Suction limitation of pumps , defects in pumping, causes and remedies of pumping	16	05
15	Cleaning and maintenance of over head tanks and sumps.	04	10	Precautions to be taken before entering the tanks and sumps.	16	05
16	Repairing of waste out let of wash basin , sink, tub with putty and washer Fixing sensor system	04	15	Causes and remedies of blockages. Sensor system for urinals and was basin, describe, types, specifications and materials required for the sensor system	16	05
17	Pressure test using hydraulic pressure testing machine.	04	10	Describe pressure test, equipments, types, method , calculation of pressure , application	16	05
18	Repair of leakages of sanitary system Scraping and painting of pipes.	04	10	Trouble shooting of leakage testing of sanitary systems , Plumbing symbols and plumbing colour codes	16	05

				Corrosion - causes and remedies, Prevention, Corrosion due to electrolytic action.		
19	Installation of Fire main systems ,hydrants & Sprinklers,	04	10	Describe, types, functioning, Specification, of Fire main systems, hydrants & Sprinklers.	16	05
20-21	Practice of 2D CAD Commands and preparing of drawing of pipe line systems	08	10	Introduction of Auto CAD for Plumbing <ul style="list-style-type: none"> • Features of Auto CAD • 2D CAD Commands • Applications for Creating Drawing Methods of Developing the CAD drawings.	32	05
22	In- plant Training				40	
23-24	Project			Project		
25	Revision			Revision		
26	Final Trade Test			Final Trade Test		

E. List of Tools & Equipment
For a batch of 20 Trainees for the trade of - Plumber

Under CITS

III. TRAINEES TOOL KIT FOR 20 TRAINEES AND A TRAINER

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 peen 800 grams	21 Nos.
8.	Hammer ball peen 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.	Still son 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.

IV. General 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	Universal Scribing Block 300 mm	5nos.
6	Hand Vice Jaw 50 mm	5nos.
7	File Flat Smooth 200 mm	10nos.
8	File Half Round Rough 300 mm	10nos.
9	File Square rough 250 mm	10nos.
10	File Square Smooth 200 mm	10nos.
11	File Triangular Rough 250 mm	10nos.
12	File Flat Rasp 250 mm	10nos.
13	File Triangular Smooth 200 mm	10nos.
14	Chisel Cold Flat 20 mmX300mm	10nos.
15	Chisel Cross Cut 6X150 mm I S-402	10nos.
16	Chisel Round Nose 3X150 mm I S -402	10nos.
17	Chisel Diamond Point 6X150mm	10nos.
18	Tap and tap wrench to cut B.S.F. , B.S.W. (Metric threads of sizes No.M6 to M-12 and British thread ¼" to 1½")	5 set each

19	Screw Pitch gauge to cover above threads	5set
20	Letter Punch 8mm	1no.
21	Number Punch 8mm	1no.
22	Hand hacksaw frame 300mm	10 Nos.
23	Spanner monkey up to 50mm	5Nos.
24	Stove melting (solder Iron and bit)	5Nos
25	Pipe Cutter wheel type 6mm to 25mm	5 Nos.
26	Oil stone 150X50X25mm	2 Nos.
27	Soldering Iron , Copper , Bit , Fire heated , Hatched , Straight , 500 grams	4 Nos.
28	Snip Straight 250mm	5 Nos.
29	Snip bend 250mm	5 Nos.
30	Try square 200mm	5 Nos.
31	Inside Calliper 150mm	10 Nos.
32	Caliper outside 150mm	10 Nos.
33	Odd leg calliper 200mm	10 Nos.
34	Tenon saw	5 Nos.
35	Hand Saw	5 Nos.
36	Mortise Chisel 6mm, 8mm, 10mm, 12mm ,15mm, 25mm	Each 5 Sets
37	Firmer Chisel	5 Sets.
38	Mallet Medium IS: 2922	10 Nos.
39	Jack plane	10 Nos.
40	Gas Welding set with oxygen acetylene cylinder	1 No.
41	Table welding 1200X 750 mm with fire bricks top and stand	1 NO.
42	Combination Pliers 200 mm	10 Nos.
43	Blow lamp 500 millilitre	5Nos.
44	Washer cutter (Hollow punch 6mm to 30mm)	Each 2set.
45	Scribing gauge	5 No.
46	Soil pot with brush	1 No.
47	Pot- Hook	3 No.
48	D. E. Spanners 6mm to 32mm IS:2028	Each 2 Sets
49	Branch Gimlets	2 Nos.
50	Bending Spring	2 Set
51	Plumbers Ladle	2nos
52	Caulking Tool (set of 5nos.)	2 Set

53	Plumbers' metal melting pot 10 kg	1 no.
54	Pipe Die and Die stock (¼" to 2½") with complete set	4 sets
55	Pipe vice up to 75 mm IS -2587	8 nos.
56	Still son pattern pipe wrenches 450 mm IS -4003	10sets
57	Still son pattern pipe wrenches 300mm	10sets
58	Chain pipe wrench 90mm -650 is 4123	2sets
59	Adjustable spanner12" IS- 6149	10nos
60	Anvil 50 or 63 kg. IS- 510	1no
61	Pipe bender manually operated	2no
62	Leg vice 75mm jaw with Stand IS -2588	1no
63	Hand drill machine up to 13mm capacity with drill chuck (Electric)	1no
64	Drill Twist (straight shank) 1.5mm to 13mm	Each 3set
65	Portable forge 450mmwith hand blower	1no
66	Smithy tong different shapes	Each 2nos.
67	working bench 2400x1200x750mm with 4 voice 125 mm jaws	5nos.
68	Bath tub small size	2no.
69	Wash Basin (16"X14"X10")Equivalent metric	5nos.
70	Water Heater 10 litres	5nos.
71	Water closet (European type p) complete with over head cistern	2set
72	Water closet (Indian type) complete with over head cistern	2set
73	Urinal wall type complete with automatic system	1set
74	Water meter	5nos.
75	Black Board with glass	2nos.
76	Fire Extinguisher (CO2and DCP)	Each1no
77	Fire Buckets with stand	2nos.
78	Hammering drilling machine (6mm to 32mm) with drill bit	Each 2nos.
79	Electric PPR pipe welding machine	1 No
80	Electric pump, 1 HP ((Centrifugal, reciprocating, submersible pumps, etc.)	1 no.
81	Pedestalgrindermachine	1 No.
82	Hydraulic pressure machine for testing leakage in pipe fittings etc.	1No.
83	Sight rail and boning rod	1 No.
84	Ratchet pipe die set 15 mm to 32 mm	1 No.
85	Bench drilling machine with chuck up to 25mm capacity	1 No.
86	Double face hammers	2 No.

87	Dormant, Pickaxe, Spade, Grimace	1 each
88	Pipe bender(Hydraulic type)	1 No.
89	Ring spanner set 6mm to 32mm	2 set
90	Solar water heater system	1No
91	Solar cooker	1No

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-Trap, 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

F. FURNITURE, ACCESSORIES AND AUDIO VISUAL AIDS FOR
Trade Theory-I AND Trade Practical-I (COMMON FOR ALL ENGG. TRADES)

SL. No.	Name of the tools and equipment	Qty per unit
01	Class Room Chairs (armless) / Dual desk may also be allowed	20 /10
02	Class Room Tables (3ft X 2ft) / Dual desk may also be allowed	20 /10
03	Chair for Trainer (armed) movable	01
04	Table for Trainer (4 ½ ft X 2 ½ ft) with Drawer and cupboard	01
05	LCD / LED Projector	01
06	Multimedia Computer System with all accessories with UPS (.5 KVA)	01 set
07	Computer Table	01
08	White Board (6ft X 4 ft.)	01 no.
09	LCD Projector Screen	
10	Air Conditioner 1.5Ton (OPTIONAL)	02
11	Wall Clock	01 no.
12	Wall charts, Transparencies and DVDs related to the trade	As required

G. LIST OF TRADE COMMITTEE MEMBERS

Sl. No.	Name & Designation Sh./Mr./Ms.	Organization	Mentor Council Designation
1.	Prof. Nirjhar Dhang. (H.O.D)	Dept. of Civil Engg. IIT Kharagpur	Chairman
2.	Col. N. B. Saxena.	Construction Skill Development Council of India (CSDCI)	Member
3.	Satish Gottipati. (M. D.)	Preca Solutions (E)	Member
4.	Meena Raghunathan. (Director, Community Science.)	GMRU Foundation, Hyderabad.	Member
5.	D. K. Chattopadhyay. (Training Officer.)	ATI, Kolkata. Dasnagar, Howrah.	Member
6.	S. R. Vhatkar. (Training Officer.)	ATI, Kolkata. Dasnagar, Howrah.	Member
7.	A. K. Naskar. (Training Officer.)	ATI, Kolkata. Dasnagar, Howrah.	Member
8.	S. Chockalingam. (Training Officer.)	CTI, Chennai,	Member
9.	Tapan Kr. Halder. (Training Officer.)	RDAT, Kanpur.	Member
10.	Arpana Singh. (T.O.)	N.V.T.I (W) Noida.	Member
11.	P. Karithashankar. (T. O.)	N.V.T.I (W) Noida.	Member
12.	Simni. (T. O.)	N.V.T.I (W) Noida.	Member
13.	Suman Kumari. (T. O.)	N.V.T.I (W) Noida.	Member
14.	M.C Sharma	DGE&T (HQ)	Mentor

