

**Syllabus**  
**For the Trade of**

**SANITARY HARDWARE FITTER**

**Under**  
**Craftsmen Training Scheme (CTS)**

**2002**

**Designed by**

**Govt. of India**  
**Ministry of Labour (D.G.E.&T.)**  
**Central Staff Training and Research Institute**  
**EN Block, Sector V, Salt Lake City,**  
**Kolkata – 700 091**

**List of the Trade Committee Members approved the syllabus for the trade of  
“Sanitary Hardware Fitter” under CTS**

1.	Shri H.Somasundram,	Director, CSTARI, Kolkata	Chairman
2.	Shri Samir Kumar Sengupta	Executive Engineer, Bidhannagar Municipality Salt Lake city, Kolkata.	Member
3.	Shri Subrato Saha	Dy. Project Manager, Makintosh Burn Limited, Kolkata.	Member
4.	Shri Sanjay Kant	Dy. Director of Trg. CSTARI., Kolkata	Member
5.	Shri P. N. Yadav	Dy. Director of Trg. CSTARI, Kolkata	Member
6.	Shri M.S.Ekambaram	Asst. Director of Trg. CSTARI, Kolkata	Member
7.	Shri M. B. Karketta	Training Officer CSTARI, Kolkata	Member
8.	Shri P. K. Kolay	Training Officer CSTARI, Kolkata	Member
9.	Shri A. K. Samaddar	Jr. Technical Assistant CSTARI, Kolkata	Member
10.	Shri P. K. Ghosh	Sr. D'man CSTARI., Kolkata	Member
11.	Shri G. Nandi	Jr. D'man CSTARI., Kolkata	Member

## **GENERAL INFORMATION**

1. Name of the Trade : SANITARY HARDWARE FITTER
2. N.C.O. Code No. :
3. Duration of Craftsmen Training : 06 months
4. Entry Qualification : Passed in VIII Class Examination  
Under 10 + 2 system of Education  
or its equivalent
5. Unit Strength : 16 Trainees
6. Space Requirement : 3.50 Sq. M per trainee

**SYLLABUS FOR THE TRADE  
OF  
“SANITARY HARDWARE FITTER”**

WEEK NO.	PRACTICAL	THEORY	ENGINEERING DRAWING	W/CALCULATION & SCIENCE
1	2	3	4	5
01	Familiarisation with the Institute. Importance of the trade training machineries. Types of work to be done by trainees in the Institute.	Importance of the trade in the development of industrial economy of the country. Importance of safety and general precautions observed in the Institute and in the section. Necessary guidance to be provided to the new comers to become familiar with the working of Industrial Training Institute.	Free hand sketching of straight lines, rectangles, Squares, circles, polygons etc. (IS: 696)	-----
02	Fitter Hand Tools: use of steel rule, Engineers' square, scribe and dividers, hacksaw, centre punch, chisels, hammer, callipers different files, bench vice and hand vice, taps, dies and holders	Safety precautions and elementary First Aid, common hand tools of Fitter trade-their name, description and material.	Free hand sketching with dimension to scale and proportionate sketching of hacksaw, centre punch, chisel, hammer, calipers, files, vices, taps and dies, holders, etc.	Applied workshop problems involving multiplication and division. Decimal addition, subtraction, multiplication and division. Conversion of decimal to common fraction and applied problems.
03	Use of hacksaw, centre punch, filing to line drilling holes. Filing a work-piece flat and square. Fastening devices – fixing of mating pairs, check nut, locking pins. Use of mason hand tools: straight edge spirit level, plum bob, square, etc.	Description of simple fitting operations, hacksawing, punching and filing. Types of files. Marking instruments and their uses. Description of different types of locking and fastening devices. Description and use of mason's hand tools.	- do -	Applied workshop problems involving common fraction addition, subtraction, multiplication and division.
04	Use of hammers – chipping. Grinding of chisels, cold chisel, round nose chisel. Drilling and tapping, dieing, making internal and external threads.	Method of using drills, taps and dies. Description of simple drilling machine.	Sketching of views of simple bodies.	Proportions and uses of cast iron, wrought iron plain carbon steel, high speed steel & alloy steel. Applied workshop calculation problems.

1	2	3	4	5
05	Threading pipes of various sizes. Fixing of different fittings.	Different kinds of joints in joining pipes (GI, CI, PVC and HDPE, etc.)  IS specification of pipe thread. Pipe description – PVC, HDPE, welding torch and filler material.	Free hand sketching of bolts, nuts and different fasteners and washers with dimensions.	Properties and uses of copper, zinc, lead, tin, aluminium, brass, bronze, solder, bearing metals, timber, leather, asbestos, plastic materials, ceramic, asphalt, etc. Reduction in common fractions to decimal fraction, shop problems.
06 & 07	Construction of an inspection chamber of any convenient size. Forming, benching and channelling and Plastering the walls.	Method of inspection of chamber, septic tank. Plain cement concrete, RCC and its Proportion, grades of coarse aggregate and fine aggregate, jhama - concrete with cement mortar and lime mortar. Knowledge of waterproofing compound.	Simple orthographic projection – First angle.	Metric system: weight and Measurement units.
08	Use and care of the plumber's hand tools and equipment. Identification, demonstration and precautions to be observed.	Description of plumber's tools and equipment and their safety.	Simple orthographic projection – first angle.	Square root of a whole number and a decimal.
09	Cutting pipes of different metals of different dimensions. Fixing of rain water pipe, draining of rainwater and ground water.	Care, use of tools and materials used in sanitary hardware work - brass, copper, zinc, lead, tin, solder, gun metal, etc. White lead and red lead.	Simple orthographic projection – third angle.	The weight of body – unit of weight and shop problem. Percentage and its application – shop problems.
10	Fixing of waste pipe of cast iron and asbestos cement with suitable bends and junction jointing with lead and cement.	Description of soil and waste pipe. Description of rain water pipe. Single and double pipe system specially used in soil and waste pipe line work.	Views from hollow and solid bodies with dimensions. Types of lines - symbol and use.	CGS, FPS and SI system of units of length, weight and their conversion.

1	2	3	4	5
11	Fixing of vent pipe for soil and waste pipe, anti-siphon pipes.	Description of vent pipe and its importance. Description of anti siphon hardware items and fittings. pipe and its importance.	Views from hollow and solid bodies with dimensions. Types of lines – symbol and use.	Ratio and proportion, applied problems.
12	Water distribution system. Fixing of floor traps in kitchen and bath. Threading of GI pipes, using pipe die of various sizes, steps of simple pipe connection.	Distribution system for OHR. Description of traps, valves.. Types of traps, valves, method of testing of soil and waste pipes.	Standard sizes of pipes, outside and inside diameter, thickness of different pipes  Symbols used in sanitary their units.	Work, power and energy, Applied problems on work, power and energy. as per IS specification.
13	Layout of water pipe connection to the sanitary fittings using different types of valves and fittings. Laying and jointing of cast iron pipes (lead pouring and lead caulking )	Storage tank, distribution of water, intermittent and constant water supply system, gravity system, pumping, storing and distribution of water.	Simple isometric drawings Reading of pipeline drawing and isometric drawing of pipeline distribution system.	Definition of friction related Work, power and energy. terms, types of friction, advantage and disadvantage of friction in practical field.
14	Reconditioning of taps valves, cistern and checking for correct functioning.	Causes of damage of taps, valves, water meter and tank, etc. method of rectification and modification. Testing of water leakage (by pressure test and smoke test)	-- do --	Friction on plain & inclined surfaces. Problems on friction.
15	Practicing on cutting and shaping PVC/ HDPE pipes to sizes, use and fixing of PVC/HDPE fittings and joints, layout according to drawing.	PVC/HDPE description of ISI specification of pipe, properties and uses, method of cutting and preparation of joints. Layout of PVC/HDPE pipes. Saddle connection for house service.	Simple isometric drawings. Isometric views of simple objects- squares, rectangles, cubes and blocks, etc.	Centre of Gravity – meaning and location. Mass, weight and Specific gravity.
16	Installation of Indian and Western style water closet with flushing cistern, flush pipe connection, water connection, etc., drainage outlet line, inspection chamber.	Description of Indian and Western style WC and RWC – their difference. Standard sizes, types precautions to be observed while installing.	Drawing of symbols – pipes, valves and fittings.	Menstruation: areas of rectangle, square, triangle, circle and regular polygon.

1	2	3	4	5
17	Installation of urinal with automatic flushing, cistern fixing lead waste or PVC waste and connected to the same to the inspection chamber.	Types of urinal, description of flushing devices, tipper automatic tank, siphonic ball, syphonic tank of high level and low level, working principle of flush valve and siphon ball valves, check valves.	Line diagrams of the water service line.	Shop problems on areas of rectangle, square, triangle, circle and regular polygon.
18	Installation of wash basin with lead waste or PVC waste pipe, connecting pillar tap to service line, fixing of mirror plate, glass self, towel rail, soap dish, hot and cold taps with popup, waste connection to the gully trap or floor trap.	Description of wash basin its standard sizes, types and accessories required for installation, mirror fittings, glass self-fittings, towel rail fittings and precautions for their installation.	Line diagrams of water service line with valves and fittings	Heat and temperature – their metric scale. Fahrenheit and centigrade scales and their conversion
19	Installation of sink with drain board waste outlet and connection with all fittings, water service connection to the sink.	Description of sink, types and sizes of kitchen sink, pantry sink, bedpan sink, laundry sink, slop sink, etc., waste outlet fittings with suitable sizes.	Reading of building plan and marking the position of sanitary fittings, water supply line, drainage line and connection to sewage line.	Shop problems on determination of volume and weight of solid bodies.
20	Installation of bath tub with hot and cold water connection with shower, overflow and waste connection, soap dish, etc.	Description of bath tub, accessories required for installation.	Reading of building plan and marking the position of sanitary fittings, water supply line, drainage line and connection to sewage line.	Simple estimation of required material for different work-pieces.
21	Demonstrating the working principle of bidet washing through range, WC range, urinals flushing arrangements and method of arranging the waste outlet.	Importance of introducing trap of the sanitary fittings. Deep seal traps and low seal traps, crown vent, left side and right side vent, vent materials and sizes.	Reading of building plan and marking the position of sanitary fittings, water supply line, drainage line and connection to sewage line.	Simple estimation of required material for different work-pieces.

1	2	3	4	5
22	Laying and jointing of stoneware pipe with the help of straight rail and boning rod, jointing of stoneware pipes, according to soil conditions and water level.	Conservancy system and water carriage system. Combined systems of drain and separate system of drain and types of drain. Method of setting straight rail and boning rod and gradients to be allowed to Stoneware pipes according to the size. Self cleaning velocity sewage system.	Longitudinal section of house drain. Drainage arrangements of workshop of an institution.	Estimation on requirements of materials for pipe layout and installation.
23	Fixing of gully trap and connecting the same to the chamber.	Earthwork excavation, laying drain pipes, precautions to be observed, Full shoring / partial shoring for the trench, width of the trench corresponding depth of the drain, refilling of trench, testing of drain pipes (pressure, smoke and light test)	Drainage arrangements of workshop of an Institution.	Estimation on requirements of materials for pipe layout and installation.
24	Providing septic tank, soak pit, manhole, vent pipe, etc. and waste water disposal.	Description of vent pipe and its necessity. traps used in drainage line, Greece trap, gully trap, interceptor, types of manholes, cesspool, soak pit, septic tank, size of septic tanks according to the users, dispersion trench.	Drainage arrangements of an administrative building.	Revision
25	Cleaning of sanitary fittings, scrapping and painting of pipes, tracing out leakage and repairing valves, taps, pumps, air locks in pipe lines and removal. Use of epoxy resin. Renewal of joint. Renewal of packing from valves, taps and pumps.	Corrosion – its causes and remedies prevention of corrosion. Corrosion due to electrolytic action. Use and reason of packing. Important points to check the proper working of pipe lines. Recycling system of rainwater.	Exercises on Engineering Drawing.	Revision
26	----- R E V I S I O N   &   T E S T -----			



**ACHIEVEMENTS:** The Trainees should be able to do the following –

1. Joining pipes of different materials – C.I., G.I., M.S., Asbestos Cement, PVC / HDPE, etc.
2. Repairs of valves, cocks, etc.
3. Tracing out leakages and rectifying the defects.
4. Installation of Water Closet
5. Installation of flushing cistern
6. Installation of urinals.
7. Installation of automatic tank and flush valve
8. Installation of washbasin, sink and bath tub.
9. Method of installing a bidet, working trough range urinals.
10. Laying a jointing of drainage pipes.
11. Fixing of gully trap.
12. Fixing of vent pipe in drainage system.
13. Cleaning sanitary fittings.
14. Estimating materials requirement of sanitary hardware from a building layout.

**N. B. Social Studies:** The syllabus has already been approved and is same for all the trades.

## TRADE: SANITARY HARDWARE FITTER

### List of Tools and Equipment for a batch of one Unit of 16 Trainees

Sl. No.	Item	For Instructor	For Trainees
1	2	3	4
<b>TOOL KIT</b>			
1.	Steel rule 300 mm. both in inch and mm.	1 no.	16 nos.
2.	Rule wooden 4 fold 600 mm.	1 no.	16 nos.
3.	Hacksaw frame adjustable for 250 to 300 mm	1 no.	16 nos.
4.	Scriber 200 mm.	1 no.	16 nos.
5.	Centre Punch 100 mm.	1 no.	16 nos.
6.	Chisel, cold, flat 20x250 mm.	1 no.	16 nos.
7.	Hammer ball pein 800 gms.	1 no.	16 nos.
8.	Hammer ball pein 300 gms.	1 no.	16 nos.
9.	File flat rough 300 mm.	1 no.	16 nos.
10.	Level spirit wooden 300 mm.	1 no.	16 nos.
11.	Plumb bob 50 gms.	1 no.	16 nos.
12.	Trowel 125 IS: 6013	1 no.	16 nos.
13.	Stillson wrench 200 & 300 mm.	1 each	16 nos.
14.	Screw driver 250 mm.	1 no.	16 nos.
15.	Wooden mallet small IS: 2022	1 no.	16 nos.
16.	Cutting Pliers 200 mm. IS: 3650	1 no.	16 nos.
17.	Steel Tape	1 no.	16 nos.

### **TOOLS, MEASURING INSTRUMENTS, SHOP OUTFIT & GENERAL INSTALLATIONS**

18.	Surface Plate 400 x 400 mm. Grade 1	1 no.
19.	Scribing Block universal 300 mm.	1 no.
20.	Hand Vice Jaw 50 mm.	2 nos.
21.	File flat smooth 200 mm.	2 nos.
22.	File half round rough 300 mm.	2 nos.
23.	File square rough 250 mm.	2 nos.
24.	File square smooth 200 mm.	2 nos.
25.	File triangular rough 250 mm.	2 nos.
26.	File flat rasp 250 mm.	2 nos.
27.	File triangular smooth 200 mm.	2 nos.
28.	Chisel cold flat 20 mm. x 300 mm.	2 nos.
29.	File square rough 250 mm.	2 nos.
30.	Chisel cross cut 6 x 150mm IS: 402	2 nos.
31.	Chisel round nose 3 x 150 mm IS: 402	2 nos.
32.	Chisel diamond point 6 x 150 mm	2 nos.
33.	Tap and die set to cut BSP thread	1 set
34.	Punch letter set	1 set
35.	Punch number set	1 set
36.	Chase wedge 50 mm	3 nos.
37.	Dress lead 350x50 mm	4 nos.
38.	Stick setting in 350 x 50 mm	4 nos.
39.	Saw plumber 300 mm	4 nos.

40.	Spanner monkey upto 50 mm	2 nos.
41.	Cutter pipe wheel type 6 mm to 25 mm	1 no.
42.	Pipe jointer, lead, universal	1 no.
43.	Oil stone 150 mm x 50 mm x 25 mm	3 nos.
44.	Soldering iron, copper fit, fire heated hatched, straight 500 gms.	4 nos.
45.	Snip straight 250 mm.	4 nos.
46.	Try square 200 mm	4 nos.
47.	Inside calliper 150 mm	4 nos.
48.	Caliper outside 150 mm	4 nos.
49.	Odd leg calliper 200 mm	4 nos.
50.	Tenon saw	2 nos.
51.	Handsaw	2 nos.
52.	Mortice chisel	2 sets
53.	Firmer chisel	2 sets
54.	Mallet medium IS: 2922	2 sets
55.	Jack plane	2 sets
56.	Pliers combination 200 mm	2 nos.
57.	Blow lamp 500 millilitre	4 nos.
58.	Pipe opener	1 no.
59.	Washer cutter	1 no.
60.	Pressing stick	1 no.
61.	Mandrel	2 nos.
62.	Plumber kit containing tampion, bent pin, plumbers hammers dressers, mallets, chase wedges, draw knife and step turner.	2 sets
63.	Bobbin and follower	2 each
64.	Bend bolt	2 nos.
65.	Sheet lead knife	2 nos.
66.	Chipping knife	2 nos.
67.	Mirror 100 x 150 mm	2 nos.
68.	Splash stick	1 no.
69.	Soil pot with brush	1 no.
70.	Pot hook	1 no.
71.	Turn pin	1 no.
72.	D.E. spanners 7 x 8, 10 x 11, 13 x 17, 19 x 22, 24 x 27, IS: 2028	2 sets
73.	Branch gimlets	2 nos.
74.	Bending spring	1 set
75.	Long dummy	2 nos.
76.	Short dummy	2 nos.
77.	Plumbers ladle	2 nos.
78.	Joining cramp	2 nos.
79.	Plumbers metal melting pot 10 kg.	1 no.
80.	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.	6 sets
81.	Pipe vice to grip pipes upto 77 mm, IS: 2587	8 nos.
82.	Tool caulking set of 2	2 sets

83.	Stillson pattern pipe wrenches 450 mm to take pipe upto 52 mm dia IS: 4003.	2 sets
84.	Stillson pattern pipe wrenches 300 mm to take pipe 20 mm to 32 mm.	2 sets
85.	Chain pipe wrench 90 mm –650 mm IS: 4223	1 no.
86.	Adjustable spanner A 375 IS: 1649	2 nos.
87.	Anvil 50 or 63 kg. IS: 510	1 no.
88.	Pipe bender manually operated	1 no.
89.	Vice leg 75 mm, jaw on stand IS: 2588	1 no.
90.	Hand drill 6 mm capacity with drill chuck	1 no.
91.	Drill twist (Straight shank) 3 mm to 6 mm	1 set
92.	Portable forge 450 mm with hand blower	1 no.
93.	Flat smithy tong	2 nos.
94.	Working bench 2400 x 1200 x 750 mm with 4 vices 125 mm jaws.	2 nos.
95.	Bath tub small size	1 no.
96.	Stop tap water 20 mm IS: 781	4 nos.
97.	Wash basin (16" x 14" x 10" ) equivalent metric	2 nos.
98.	Water heater 22 litres	1 no.
99.	Water closer (European type with down type cistern)	1 set
100.	Water closer Indian type complete with over head cistern	1 set
101.	Urinal-wall type complete with automatic system	1 set
102.	Water meter	2 nos.
103.	Steel lockers with 8 drawers	2 nos.
104.	Metal rack 1800 x 1500 x 450 mm	1 no.
105.	Desk	1 no.
106.	Stool	1 no.
107.	Black board with easel	1 no.
108.	Fire extinguisher	1 no.
109.	Fire buckets with stud	1 no.
110.	Steel almirah	1 no.
111.	Ratchet brack with post and clamp flat drill 6 to 35 mm by 0.2 mm	1 set
112.	PVC welding plant	1 no.
113.	Electric pump 1 HP	1 no.
114.	D.E. pedestal grinder with two wheels 175 rough and smooth	1 no.
115.	Hydraulic pressure machines for testing leakage in GI pipe fitting etc.	1 no.
116.	Sight rail and banning rod	1 each
117.	Ratchet pipe die 15 mm to 32 mm	1 no.
118.	Bench Drilling machine with chuck and key upto 15 mm cap	1 set
119.	Double face hammers	4 nos.
120.	Dormat, Pickle, spade, Girmale	1 each
121.	Pipe bender (Hydraulic type)	1 no.
122.	Monkey Plier (Gas pliers)	4 nos.