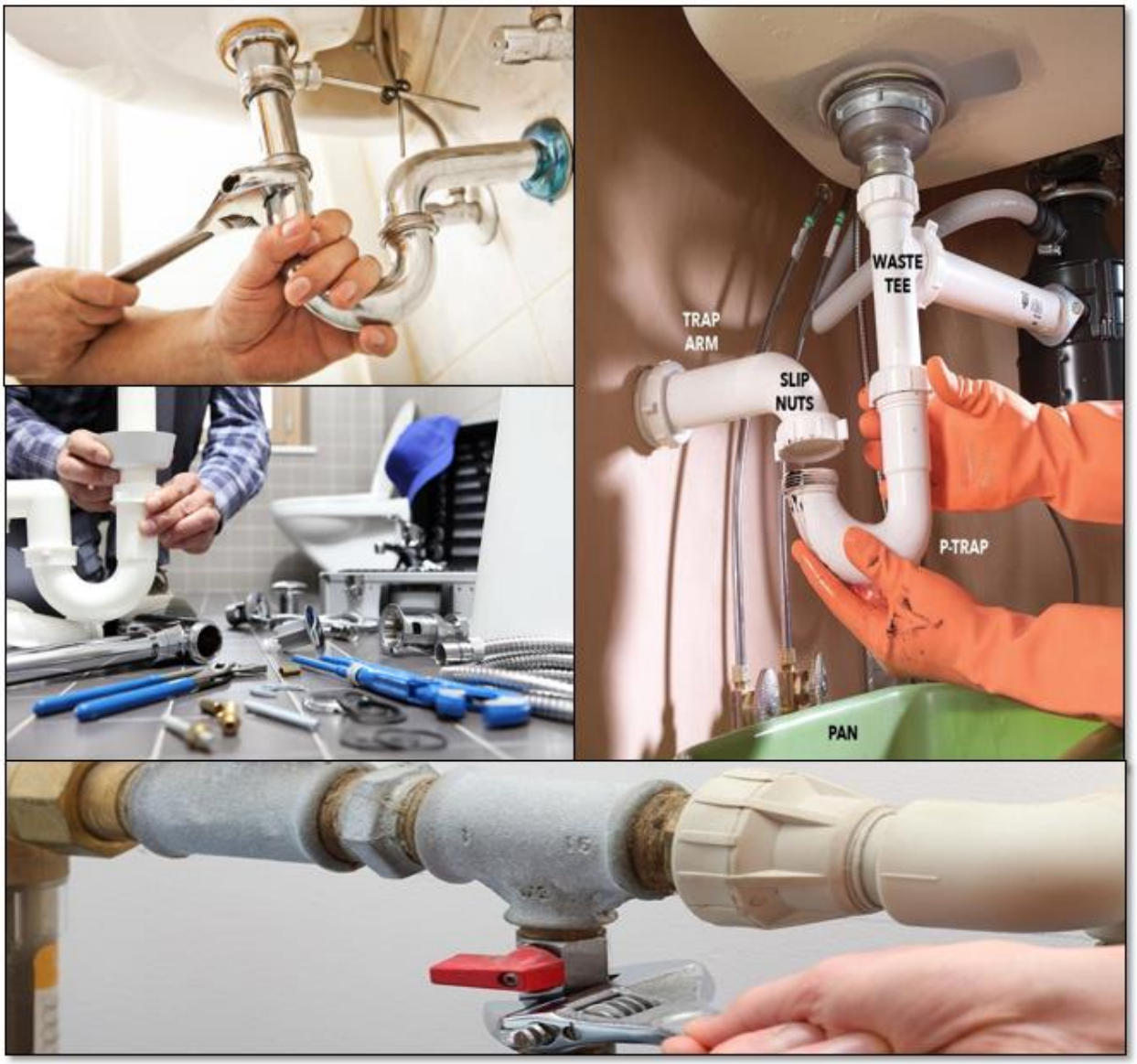
SYLLABUS FOR THE TRADE OF

PLUMBING TECHNICIAN



UNDER
INDUSTRIAL SCHOOL PATTERN
By
DEPARTMENT OF EMPLOYMENT AND TRAINING
GOVERNMENT OF TAMILNADU

LIST OF COMMITTEE MEMBERS

FOR THE TRADE PLUMBING TECHNICIAN

Sl No.	Members and Experts	Signature
1	N. Babu, Deputy Director of Training (i/c), Board of Examination for Vocational Training, Department of Employment and Training, Guindy, Chennai – 600 032	
2	D. Sundar, Assistant Training Officer, Plumber Trade, Government Industrial Training Institute, Ambattur – 600 098	
3	R. Sundar, Assistant Training Officer, Plumber Trade, Government Industrial Training Institute, North Chennai – 600 021	

*****

COURSE DETAILS

Name of the trade	:	PLUMBING TECHNICIAN
Qualification	:	VIII Std Pass
Age	:	14 to 40 years
Duration	:	1 Year
No. of Trainees	:	20
No. of Practical Hours	:	32 Hours per week
No. of Theory Hours	:	8 Hours per week
Workshop calculation	:	2 Hours per week
Engineering Drawing	:	2 Hours per week
Space required		
• Workshop	:	800 Sq.ft (Excluding open yard with dummy walls for practice)
• Theory	:	200 Sq.ft.
Power required	:	1 KW

*****

Syllabus for the Trade of Plumbing Technician – Theory & Practical

Week No.	Trade Theory	Trade Practical
1	• Familiarization with the institute. • Importance of trade training. • Machinery used in the type of work done by trainees in the institute. • Type of jobs made by the trainees in the trade. • Introduction to safety: Equipment including firefighting and their uses.	• Importance of safety and general precautions required for the trade. • Importance of the trade. • Types of work to be done by trainees in the institute. • Scope of a plumbing work. • Types of services has to plan. • Basic Bench fitting.
2 & 3	• Use of steel rules, engineers square, Scriber and dividers for marking out from drawing. • Technique of handling properly the various Fitter's hand tools: hacksaw, centre punch, chisels, hammer, callipers, different files, bench vice and hand vice, taps, dies and holders.	• Fitter's common hand tools - names, description and material from which they are made. • Description, types and uses of holding device, hammers & cold chisels, cutting tools
4 to 6	• Use of hacksaw, centre punch, Marking, filing, drilling holes and sawing. • Different types of Files & filing to line. • Filing a job flat and square. • Use of various locking devices. • Fastening devices • fixing of check nut, locking pins. • Drilling and taping, dieing, making internal and external threads. • Threading pipe of various sizes. • Fixing of different fittings.	• Description of simple fitting operations hack sawing, punching and filing. • Types of files used commonly. • Marking instruments and their use. • Method of using drills, taps and dies. • Description of simple bench drilling Machine. • Description of different types of locking and fastening devices. • Different types of pipes GI,CI,PVC/CPVC, UPVC, PPR, AC and HDPE etc.
7 to 10	• Use of mason hand tools: Straight edge spirit level, plumb bob, square, etc. • Setting out work with tape, rule, square, line pin, and level. Cutting bricks and stones to given size and template. • Preparation of lime & cement mortars in different proportions to suit various purposes. • Elementary brick work such as construction of gulley trap &	• Names, description and their uses. -Method of making holes in walls and floors. • Types of tools used and various Processes. • Concept of bricks, lime and cement. • Preparation of mortars with various materials of varying composition. • Common brick joints. • Description of bonds. • Scaffolding & plastering.

	inspection chamber of any convenient size. • Forming, benching and channeling and plastering the walls. • Cutting of wall with Masonry electric cutting tools.	• Plain cement concrete, RCC and its proportion, • Grades of coarse aggregate and fine aggregate, • Define explain concrete with cement mortar and lime mortar. • Knowledge of waterproofing compound.
11 to 15	• Use and care of the plumber's tools and equipments. • Cutting of pipes of different metals of different dimensions and sizes. • Bending of G.I. pipes up to 50 mm and PVC pipes • Bending methods. • Practice on cutting pipe at different angles for different joints.	• Identify plumbing services required for each type of building according to usage. • Description of plumber tools and Equipments - ratchet, brace, threading die, pipe wrench, adjustable wrench, spanner set, chain Wrench etc. and their safety. • Plumbing Symbols. • Care & use of tools. • Pipes different kinds. • Pipe fitting – bends, elbows, sockets, tees, unions etc. • Their description, specification and use.
16 & 17	• Water distribution system. • Steps of simple pipe connection • Fixing of floor traps in kitchen and bath.	• Hard & Soft water, temporary hardness & permanent hardness - water softners – tests for water – static water • pressures and measurement of pressures. • Bursting pressure, Expansion of water on freezing and heating. • Bernoulli's principles • Pascal's law • pressure of water on the sides of cistern or tank. • Water hammer in pipes.
18	• PVC welding • PPR pipe welding joint	• Equipments and tools for hot gas welding and electric hot plate for PPR pipe joints
19 to 22	• Fixing of different pipe accessories such as bends, flanges, tees, elbows, sockets, cocks and valves. • Making of simple joints for different purposes using above. • Socket joint of cast iron pipes with lead	• Types of fittings for different joints & different pipes. • Description of pipe fittings. • Methods of joining and their uses. • Precautions to be taken while fixing.
23 to 25	• Practice on cutting & shaping P.V.C. pipes to sizes.	• Water purification stages and methods

	• Use & fixing of P.V.C. pipe fittings • Preparation of P.V.C. pipe joints. • Layout of P.V.C. pipe according to drawing.	• Impurities of water – organic and inorganic impurities • Sources of water • Different kinds of joints in joining pipes- GI, PVC/CPVC, UPVC and HDPE etc. • P.V.C. Description, Properties & use in plumbing work. Method of cutting & preparing joints. • P.V.C. fittings their description & use. • Method of laying out PVC pipe.
26	• Revision & Test	• Revision & Test
27	• Laying out of asbestos pipes -according to drawing alignment of pipes and joining them. • Repair of leaks. (The pipe of minimum dia should be used).	• Use of hummed and asbestos pipes of different sizes. • Method of laying out pipes alignment and joining.
28	• Joining of pipes with different materials and diameters with various fittings.	• Description of various pipe joints- straight, Branch, Tee and elbow.
29 to 31	• Installation of electric pumps (centrifugal, reciprocating, submersible pumps, etc.)	• Description and types of pumps viz. suction pump, Centrifugal pump etc. • Priming and removal of air locks
32	• Repair of hand water pumps and other pumps	• Water supply system of a small town. • Contamination of water in a well.
33 to 34	• Practice on cutting external threads on PVC pipes and joining for different purpose	• Description of pipe dies, their uses, care and precaution. • Metric specification of various pipes. • Standard pipe threads. • Method employed for bending, Joining and fixing PVC pipe. • Joining material for water and gas pipes.
35	• Construction of inspection chamber & gully traps.	• Inspection chamber, septic tank, description of drains, cess pools, soak pits etc. • Types of traps • Layout of drainage system.

36	• Cast iron socket and spigot joint providing with lead and Caulking.	• Testing of drainage lines smoke test, water test, smell test, ball test, mirror test.
37	• Tracing out leakages and repairing of water supply system.	• Method of dismantling and renewal of the valves and pipes. Leaks in pipes and noises in plumbing. • Air lock in pipes and its removal.
38	• Practice on fixing of different water, gas and steam cocks and valves. • Repairing practice including renewal of packing, washer, gasket etc.	• Description of cocks & valves- their types, materials & advantages for particular work.
39 to 42	• Erecting simple water supply system including Installation of water meter. • Branching of pipes. Fixing, testing & repair of Bath tub, wash. basin etc. • Erecting rain water and drainage piping system. • Installation of sanitary fittings like water closets, urinals • Rain water Harvesting System.	• Erecting rain water and drainage pipe system. • Installation of sanitary fitting s, inspection and testing of water supply system. • Pipe alignment and slope. - Prevention of water hammer. • Storage tanks for general water supply propose. • Test for water supply pipes. • Description of sanitary fittings, • General points to be observed when choosing sanitary fittings.
43 & 44	• Bending of galvanized pipe as per drawing using bending machine with dry sand by heating.	• Method of bending galvanized and other heavy pipes. • Fire hydrants
45 & 46	• Fixing of PVC waste pipe with branch to receive waste water from bath & wash basin and another branch from sink. • Fixing of external PVC soil pipe with branch to take soil pipe from W.C. • Fixing of PVC rain water pipe gutter, outlet and ground pipe to gully trap.	Domestic drainage system: • General layout, • One pipe system, • Specifications of materials required. • Method of testing leakage. - Different types of traps, ventilation, antisyphonage.
47 & 48	• Measurement, cutting, preparation and fixing up of rising mains and • Distributing pipes as per layout. • 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. • Domestic hot and cold water. • General layout, specification of materials required and

	• Installation of hot water system.	• Connection of pipes to mains. • Tracing leakage. • Repairs to service main. • Domestic boilers and Geysers. • Method of ventilating pipe. • Precaution against air Poisoning. • Fixing of solar water system.
49	• Repairing of waste outlet with putty and lead washer. • Reconditioning of taps, valves, overhead tanks, flushing tank etc. • Testing for correct functioning. • Pressure test using hydraulic pressure testing machine	• Plumbing symbols and plumbing codes for all tools and materials
50	• Cleaning of sanitary installations including. pipes. • Scraping and painting of pipes. • Repairing of broken or cracked sanitary fittings.	• Sensor system for urinals and wash basin, etc. • Corrosion - causes and remedies, prevention. • Corrosion due to electrolytic action. • Effect of water and frost on materials. • Layout of pipes as per drawing.
51	• Revision & Test	• Revision & Test
52	• Final Examination	• Final Examination

****

Syllabus for the Trade of Plumbing Technician – Workshop calculation

Week No.	Workshop calculation
1-2	• Problems involving multiplication & division of whole numbers. • Addition, subtraction multiplication & division of fractions. • CGS and FPS system of units of length, weight, their conversion.
3 4	• Proportions and uses of cast iron, wrought iron, plain carbon steel, high speed steel and alloy steel. • Metric system metric wrights and measuring units.
5-6	• Decimals: Addition, subtraction, multiplication & division. Conversion of decimal to fraction and vice-versa. Site problems. • Identification of elementary properties and uses of copper zinc lead, tin, aluminium, brass, bronze, solder, bearing metals, timber. Asbestos, plastic materials, ceramic, asphalt.
7-8	• Properties & uses of copper, zinc, lead, tin, aluminium, bras, bronze, solder, bearing metals, timber, rubber, leather, asbestos, plastic materials, ceramic asphalt etc. • Square root of perfect squares-whole numbers & decimals.
9-10	• Ratio and proportion: Problems to find out quantities of materials for various mortar & concrete mixes.
11-12	• Mensuration: Areas & perimeters of rectangles, squares and triangles.
13-14	• Areas & perimeters of circles, sectors, segments, quadrilaterals, trapezium, parallelogram & rhombus.
15-16	• Problems on areas & perimeters of polygons such as pentagons, hexagons & octagons.
17-20	• Volume & surface area of simple geometrical solids such as cubes & prisms. • Meaning of center of gravity example. • Specify gravity.
21-23	• Heat and temperature their metric scale Fahrenheit and centigrade scales and their conversion. Name and use of temperature measuring instruments used in workshops.
24-26	• Workshop problems on determination of volume and weight of simple solid bodies. • Simple estimation or requirements of material for different jobs.
27-30	• Revision & Test
31	• Calculation of volume and weight of pipes of different dia and thickness. Determination of pipe length.
32-33	• Calculation of volume and weight of pipes of different dia and thickness. • Determination of pipe length. Simple estimation of pipe requirements etc. for different types of jobs.
34-38	• Simple estimation of pipe requirements etc. for different types of jobs. • Calculation of volume and weight of water in container of different sizes.
39-40	• Electricity and its uses, electric current positive and negative terminals. Use of switches and fuses, conductor & insulators. • Reading of simple graphs.
41-42	• Meaning of work and energy. Explanation of energy H.P. Shop problems.

43-48	• Estimation on requirements of materials for various Plumbing works.
49-51	• Revision & Test
52	• Final Examination

*****

Syllabus for the Trade of Plumbing Technician – Engineering Drawing

Week No.	Engineering Drawing
1-2	• Use of different types of lines and symbols for drawing
2-5	• Use of drawing instruments - Lettering numbers and alphabets
6-7	• Free hand sketching of straight lines, rectangles, squares, circles, polygons etc. • Using drawing instruments • Use of different types of lines and symbols for drawing.
8-9	• Free hand sketching of nuts, bolts with dimensions. • Free hand sketching of rivets and washers with dimensions from sample. • Lettering number & alphabets.
10-12	• Simple orthographic projection in first angle.
13-14	• Orthographic projection in first angle.
15-16	• Views of simple hollow and solid bodies with dimensions.
17	• Views of simple hollow solid bodies with different types of lines & symbols for drawings. Plumbing symbols.
18-26	• Simple isometric drawings. Isometric views of simple objects such as squares, rectangles, cubes, rectangular blocks etc.
27-28	• Revision & Test
29	• Line diagram of the water service line.
30-32	• Layout plan of a small village or town and mark the water line with valves of all types & the position of the reservoir.
33-38	• Building plan & mark the position of the sanitary fittings, water supply line, drainage line connection to sewage line. Study of building plan & mark the position of the sanitary fittings, water supply line, drainage line connection to sewage line.
39-42	• Study of building plan & mark the position of the sanitary fittings, water supply line, drainage line connection to sewage line.
43-46	• Free hand sketching of simple objects related to the trade and preparation of simple working drawings from the sketches.
47-49	• Longitudinal section of the house drain. Drainage arrangements of workshop of an institution.
50-51	• Revision & Test.
52	• Final Examination.

*****

List of Tools & Equipments for the trade of Plumbing Technician

A. TRAINEES TOOL KIT FOR 20 TRAINEES AND ONE INSTRUCTOR

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

B. TOOLS, MEASURING INSTRUMENTS & GENERAL SHOP OUTFIT

SL. No.	Name of items	Quantity
1.	File Flat, Smooth 200 mm	2 Nos.
2.	File Half Round, Rough 300 mm	2 Nos.
3.	File, Square, rough 250 mm	2 Nos.
4.	File, Square, Smooth 200 mm	2 Nos.
5.	File Triangular Rough 250 mm	2 Nos.
6.	File Flat Rasp 250 mm	2 Nos.
7.	File Triangular Smooth 200 mm	2 Nos.
8.	Chisel Cold Flat 20 mmX300mm	2 Nos.
9.	Chisel Cross Cut 6X150 mm I S-402	2 Nos.

10.	Chisel Round Nose 3X150 mm I S -402	2 Nos.
11.	Chisel Diamond Point 6X150mm	2 Nos.
12.	Saw Plumber 300mm	2 Nos.
13.	Spanner monkey up to 50mm	2 Nos.
14.	Stove melting solder	1 No.
15.	Cutter ,Pipe, wheel type 6mm to 25mm	1 No.
16.	Snip Straight 250mm	2 Nos.
17.	Snip bend 250mm	2 Nos.
18.	Try square 200mm	2 Nos.
19.	Inside Caliper 150mm	2 Nos.
20.	Caliper outside 150mm	2 Nos.
21.	Odd leg calliper 200mm	2 Nos.
22.	Brush Steel Wire 150X 50 mm	1 No.
23.	Pliers combination, 200 mm	2 Nos.
24.	Blow lamp 500 mili litre	2 Nos.
25.	Washer cutter	1 No.
26.	Mirror 100X150 mm	2 Nos.
27.	D. E. Spanners 6x7, 8x9, 10x11, 12x13, 14x15, 16x17, 18x19, 20x22, 21x23, 24x27, 25x28 IS:2028	2 Sets
28.	Plumbers Laddle	2 Nos.
29.	Tool caulking set of 5	2 Nos.
30.	Plumbers' metal melting pot 10 kg	1 No.
31.	Pipe stock and dies complete with stocks, bushing, bushing holders, to suit pipe dia; a). 15mm, 20mm & 25mm. b). 32mm, 40mm & 50mm	2 sets each
32.	Pipe vice to grip up to 77 mm is -2587	8 Nos.
33.	Stillson pattern pipe wrenches 450 mm to take pipe up to 52 mm dia I s -4003	2 sets
34.	Stillson pattern pipe wrenches 300mm to take pipe 20 mm to 32mm	2 sets
35.	Chain :pipe wrench 90mm -650 is 4123	2 sets
36.	Adjustable, spanner, A-375, IS- 6149	2 Nos.
37.	Pipe bender, manually operated	1 No
38.	Drill Twist (straight shank) 3mm to 6mm	1 set

39.	working bench 2400x1200x900mm with 4 vices 125 mm jaws	2 Nos.
40.	Bath tub small size	1 No.
41.	Wash Basin Standard size	2 Nos.
42.	Water Heater 10 litres	1 No
43.	Water closet (European type p) complete with low level cistern	1 set
44.	Water closet (Indian type) complete with high level cistern	1 set
45.	Urinal wall type complete with automatic system	1 set
46.	Water meter	2 Nos.
47.	Steel lockers with 8 drawers Metal rack (1800x1500x450mm)	3 Nos.
48.	Metal rack (1800X1500X450mm)	1 No.
49.	Desk	1 No.
50.	Stool	1 No.
51.	Black Board with glass	1 No.
52.	Fire Extinguisher	1 No.
53.	Fire Buckets with stand	1 No.
54.	Steel Almirah (large)	1 No.
55.	Hammering drilling machine up to 25 mm dia (complete set)	1 set.
56.	Electric PPR pipe welding machine	1 No.
57.	Electric pump, 1 HP (Monobloc Pump set)	1 No.
58.	Hydraulic pressure machine for testing leakage in GI pipe fittings etc.	1 No.
59.	Sight rail and bonning rod	1 No.
60.	Ratchet pipe die 15 mm to 25 mm	1 No.
61.	Bench drilling machine with chuck and key up to 15mm capacity	1 No.
62.	Double face hammers	2 Nos.
63.	Pickaxe, Spade	1 each
64.	Pipe bender(Hydraulic type) to bend pipe up to 75 mm dia.	1 No.
65.	Instructor table	1 No.
66.	Instructor chair	1 No.

*****