

**GOVERNMENT OF THE PUNJAB**

**TECHNICAL EDUCATION & VOCATIONAL  
TRAINING AUTHORITY**



**CURRICULUM FOR**

**PLUMBER**

**(6 – Months Course)**

**Revised May, 2009**

**CURRICULUM SECTION  
ACADEMICS DEPARTMENT**

**96-H, GULBERG-II, LAHORE**

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## **TRAINING OBJECTIVES**

Main objective of this course is to produce workforce, keeping in view the local market demand & industrial requirements.

This curriculum is developed also keeping in view the requirements of market demand by more focusing on practical and necessarily required theoretical knowledge along with new subjects of functional English & work ethics.

The curriculum covers the major topics of common hand tools & equipments used for domestic / industrial plumbing systems, planning and installation of sanitary installations, fault finding and its rectification by observing safety rules, installation of drainage / sewerage systems, repair / maintenance of water lifting pumps, installation / pair of common gas appliances.

## **CURRICULUM SALIENTS**

Name of course	Plumber
Entry Level	Middle
Total duration of course	06 months
Total Training Hours	800 Hours
	40 Hours per week
	7 Hours per day except Friday
	5 Hours
Training Methodology	Practical 90%
	Theory 10%
Medium of Instruction	Urdu/ English

## **SKILL COMPETENCY DETAILS: -**

On successful completion of this course the trainee should be able to:-

1. Do the Filing, marking, measuring, sawing & drilling of metals.
2. Cut, ream and thread steel pipes.
3. Join galvanized pipe, Copper pipe, Plastic pipe & Cast Iron pipe.
4. Plan and install Bath Room installation in a house.
5. Make house connection from main city water line.
6. Lay down Drainage / Sewerage system of a house.
7. Install and repair gas meter, water heater & cooking range etc.
8. Prepare an estimate of simple sanitary installation of a house.
9. Repair / maintain the valves, faucets & Mixtures / Fixtures.
10. Repair / maintain the water pumps.

## **KNOWLEDGE PROFICIENCY DETAILS:-**

On successful completion of this course, the trainee should be able to:-

1. Explain the personal, tools & work safety.
2. Explain the working drawing, sketches and basic plumbing / sanitary installation symbols.
3. Explicate the application of measuring, marking, filing, sawing tools & instrument used.
4. Explain the use of threading dies & other threading instruments.
5. Explain the plumbing / sanitary installation tools.
6. Express the plumbing & sanitary installation regulations / standards applicable.
7. Explicate the plumbing fixtures, fittings & tell their Applications.
8. Describe the types, use & function of valves, cocks, and taps.
9. Explain the plan & estimation of simple plumbing works for single storey house.
10. Explicate the types, function & repair of water pumps.

### CURRICULUM DELIVERY STRUCTURE

Week	Course Delivery	Make up Session	Revision	Co Curricula Activities / Vacations	Final Test	Total
	1-20	21-22	23-24	25	26	26
	20	2	2	1	1	

## **SCHEME OF STUDIES**

### **Plumber**

(6 - Months Course)

<b>Sr. No</b>	<b>Main Topics</b>	<b>Theory Hours</b>	<b>Practical Hours</b>	<b>Total Hours</b>
1.	Basic Metal Work	08	72	80
2.	Pipe fittings	14	269	283
3.	Mathematics	10	0	10
4.	Technical Drawing	10	0	10
5.	Sanitary Installations and Repair / Maintenance of pumps	18	347	365
6.	Functional English	20	20	40
7.	Work Ethics (Lab Theory)	-	12	12
<b>Total</b>		<b>80</b>	<b>720</b>	<b>800</b>

## **DETAIL OF COURSE CONTENTS**

**Plumber**  
(6 – Months Course)

<b>Sr. No.</b>	<b>Detail of Topics</b>	<b>Theory Hours</b>	<b>Practical Hours</b>
<b>1.</b>	<b>Basic Metal Work</b>	<b>8</b>	<b>72</b>
	<b>1.1. Introduction (Workshop, Work Place, Tools)</b>		
	1.1.1. Order of workplace		
	1.1.2. Introduction to general tools used in the metal workshop, their care and proper use		
	1.1.3. Safety precautions		
	<b>1.2. Measuring (General Introduction)</b>		
	1.2.1. Purpose of measuring and checking tools		
	1.2.2. Accuracy of measuring		
	1.2.3. Linear measuring (steel rules, calipers, vernier calipers)		
	1.2.4. Measuring Faults		
	1.2.5. Care and Maintenance of Measuring tools		
	<b>1.3. Marking</b>		
	1.3.1. Necessity of marking		
	1.3.2. Common marking tools (scriber, steel rule, & centre punch)		
	<b>1.4. Filing</b>		
	1.4.1. Process of filing		
	1.4.2. Types of files with regards to cut and shape		
	<b>1.5. Sawing</b>		
	1.5.1. Cutting principle (rake angle)		
	1.5.2. The saw blade (pitch of teeth, setting of teeth and tightening		

	the blade in the frame)		
1.6.	<b>Drilling</b>		
1.6.1.	Drilling of through holes (effect of movements of the drill, cutting process)		
1.6.2.	Main parts (their name and function)		
1.6.3.	Clamping and removing of twist drills		
1.6.4.	Drilling faults		
1.7.	<b>Reaming</b>		
1.7.1.	Purpose and process of reaming		
1.7.2.	Types of reamers (Hand reamers, machine reamers and adjustable reamers)		
1.8.	<b>Counter Sinking and Counter boring</b>		
1.8.1.	Counter sinking tools, purpose and procedure		
1.8.2.	Size / No. of Counter bore		
1.9.	<b>Filing Exercise – I</b>		
1.9.1.	Filing of Channel		
1.10.	<b>Marking Exercise</b>		
1.10.1.	Flat Filing		
1.10.2.	Marking		
1.10.3.	Center Punching		
1.11.	<b>Filing Exercise – II</b>		
1.11.1.	Flat Filing		
1.11.2.	Square Filing		
1.12.	<b>Sawing Exercise</b>		
1.12.1.	Sawing and Square Filing within size		
1.13.	<b>Sheet Metal Box – I</b>		



	1.13.1. Filing 1.13.2. Marking 1.13.3. Shearing 1.14. <b>Drilling Exercise</b> 1.14.1. Marking 1.14.2. Center Punching 1.14.3. Drilling 1.14.4. De burring		
<b>2.</b>	<b>Pipe Fittings</b>		
	2.1. Steel Pipe	1	-
	2.1.1. Kinds of steel pipes		
	2.1.2. Nominal Sizes & length		
	2.2. Pipe Fitting	1	-
	2.2.1. Pressure / Drainage Fittings		
	2.2.2. Fitting Specifications		
	2.3. Characteristics of Pipes	2	-
	2.3.1. Properties		
	2.3.2. Rust / Corrosion		
	2.3.3. Chemical Resistance		
	2.3.4. Expansion / Heat Resistance		
	2.4. Characteristics of Pipes	2	-
	2.4.1. Advantages / Disadvantages		
	2.4.2. Comparatively analysis		
	2.5. Plumbing Symbols	2	-
	2.5.1. Importance of Pipe Symbols		
	2.5.2. Symbols definition		
	2.6. Pipe Threads	1	-
	2.6.1. BSP threads		
	2.6.2. Threads taper & angle		
	2.6.3. Threads engagement		
	2.6.4. Threads Per Inch		
	2.7. Joining Methods of pipes, Steel, Cast Iron, Copper, Plastic & A.C Pipes	2	-

2.8.	Installing & supporting of pipes		
2.8.1.	Hangers and devices	1	-
2.8.2.	Positioning and aligning		
2.8.3.	Corrosion protection		
2.9.	Public Water Supply System		
2.9.1.	Natural and Pumps Gravity	1	-
2.9.2.	Municipal Water Supply		
2.9.3.	Public Water Tanks		
2.10.	House Water Connection		
2.10.1.	Service Line	1	-
2.10.2.	Distributor		
2.10.3.	Risers Branches		
2.10.4.	Fixture Lines		
2.11.	Pipe Fitting Exercise		30
2.11.1.	Measuring, marking, cutting, Reaming & cutting threads	-	
2.12.	Cold Water Installation - I		30
2.12.1.	Measuring, marking, cutting, reaming, threading, joining & fixing	-	
2.13.	Cold Water Installation - II	-	30
2.13.1.	Measuring, marking, cutting, reaming, threading, joining & fixing	-	
2.14.	Cold and Hot Water Installation - I		35
2.14.1.	Measuring, marking, cutting, reaming, threading, joining, locating & fixing	-	
2.15.	Cold and Hot Water Installation - II		35
2.15.1.	Measuring, marking, cutting, reaming, threading, joining, locating & fixing	-	
2.16.	House Water connection		40



	decimal	$\frac{1}{2}$	
	3.12. Angles		
	3.12.1. Expressing of angle in decimal form.	1	
	3.13. Surface Area		
	3.13.1. Calculation of the area of composed surface	1	
	3.14. Area		
	3.14.1. Area of rectangle	1	
	3.15. Speed of flow		
	3.15.1. Discharge of water from pieces	1	
	3.16. Pressure		
	3.16.1. Hydraulic pressure		
<b>4.</b>	<b>Technical Drawing</b>		
	4.1. Introduction of technical drawing	$\frac{1}{2}$	
	4.1.1. Kind of lines		
	4.1.2. Drawing instrument		
	4.2. Introduction of Technical Drawing	$\frac{1}{2}$	
	4.2.1. Lettering exercise		
	4.3. Prismatic Work	$\frac{1}{2}$	
	4.3.1. Representation in cavalier projection		
	4.4. Prismatic Work	$\frac{1}{2}$	
	4.4.1. cavalier projection		
	4.5. Views Prismatic Work Piece	1	
	4.5.1. Representation of 3 views		
	4.6. Views of Prismatic Work Piece	1	
	4.6.1. Representation of 3 views		
	4.7. Prismatic Work Piece	1	
	4.7.1. Assembly body of recognition of vies		
	4.8. Prismatic Work Piece	1	
	4.8.1. Assembling		



	5.7.3. Estimate working time and cost		
	5.7.4. Install pipe line & test (line pressure)		
	5.7.5. Install the drainage line		
	5.7.6. Fit the sanitary ware		
5.8.	Drainage line installation - I		17
	5.8.1. Measuring, marking, cutting, joining, grading & leveling		
5.9.	Drainage line installation - II		24
	5.9.1. Measuring, marking, cutting, joining, grading & leveling		
5.10.	Gas heater installation		17
	5.10.1. Measuring, marking, cutting, joining, checking		
5.11.	Repair & Maintenance		27
	5.11.1. Repairing of pumps		
	5.11.2. Repairing of gland bush		
	5.11.3. Repairing of valves		
5.12.	Control valves	2	17
	5.12.1. Valves material		
	5.12.2. Automatic / non automatic valves		
	5.12.3. Locations		
5.13.	Control valves	2	17
	5.13.1. Function of Gate Valve, Globe Valve, Ball Valve, Check Valve & Relief Valve.		
	5.13.2. Effects of water flow.		
5.14.	Flushing devices	2	15
	5.14.1. Flushing tanks		
	5.14.2. Flushing valves		
	5.14.3. Locations		
5.15.	Flush tanks	2	15



## **LIST OF TOOLS AND EQUIPMENT**

(For a class of 25 students)

<b>Name of Trade</b>	<b>Plumber</b>
<b>Duration of Course</b>	<b>06-Months</b>

<b>Sr. No.</b>	<b>Name of Tools / Equipments</b>	<b>Quantity</b>
1.	Work Bench with Bench Vice 6"	25 Nos.
2.	Flat File (300 X 1)	25 Nos.
3.	Steel Foot Rule 12"	25 Nos.
4.	Hand Measuring Tape (3meter / 10 ft.)	25 Nos.
5.	Ball Peen Hammer ½ Kg	12 Nos.
6.	Tap and Die set 06mm to 12mm	04 set.
7.	Pipe Wrench 12" – 14" – 18"	25,25 &12-Nos.
8.	Chain Pipe Wrench 24"	04 Nos.
9.	Line Scriber 10"	25 Nos.
10.	Screw wrench-10"	25 Nos.
11.	Hand Hack saw	25 Nos.
12.	Cross Peen Hammer 500-1000 grams	25 -12 Nos.
13.	Center Punch 5"	25 Nos.
14.	Oil can	25 Set.
15.	Pipe Reamer 2"	12 Nos.
16.	Sprit level-12"	25 Nos.
17.	Try Square 8"	25 Nos.
18.	Half Round File 10"	25 Nos.
19.	Round File 10"	25 Nos.
20.	Blow lamp	06 Nos.
21.	Threading Die ½ " to 2" ratchet type	12 Nos.
22.	Caulking Chisels set	06 set.
23.	Plum bob	06 Nos.
24.	Pipe Vice 2" with Stand	12 Nos.



25.	Pipe Cutter ½" to 2"	12 Nos.
26.	Hand Electric Drill Machine capacity 13 mm.	04 Nos.
27.	Chisel (flat) 300 mm	12 Nos.
28.	Chisel (flat) 200 mm	12 Nos.
29.	Cross cut Chisel 180mm	12 Nos.
30.	Hallow Punch set 05 mm to 25 mm	02 set.
31.	Screw Driver Flat 10"	25 Nos.
32.	Bit drill set (Steel) 3mm to 10 mm	04 set.
33.	Bit drill (Masonry) 5mm to 13 mm	04 set.
34.	Socket Wrench set 6mm to 32mm	02 set.

## **LIST OF HAND TOOLS & MACHINES**

<b>Sr. No.</b>	<b>Name of Tools &amp; Equipment</b>	<b>Quantity</b>
1.	Electric Drill Machine (Pedestal type)	01
2.	Pipe Bending Machine Manual ½” to 2”	01
3.	Sheet bending machine	01
4.	Burring and Grooving Machine	01
5.	Sheet rollers	01
6.	Electric Thread cutting machine ½” to 2”	01
7.	Pedestal grinder	01
8.	Lead melting pot	01
9.	Lead Ladle	01
10.	Double burners	01
11.	Piston & Plunger pump outlet size 1”	01
12.	Centrifugal pump outlet size 1”	01
13.	Picks & shawls	06

## **List of Workshop/ Consumable Material**

(For a Class of 25 Students)

<b>Name of Trade</b>	<b>Plumber / Pipe Fitter</b>
<b>Duration of Course</b>	<b>06 – Month</b>

<b>Sr. No.</b>	<b>Contents</b>	<b>Quantity</b>
1.	M.S.U Channel 75 X 38 mm	30 Kg
2.	M.S. Flat 60X15mm	50 Kg
3.	M.S Flat 60 X 06 mm	10 Kg
4.	M.S Flat 40 X 06 mm	06 Kg
1.	G.I. Pipe ½” dia.	200 ft
2.	G.I. Pipe ¾” dia.	40 ft
3.	G.I. Elbow ½”	48 Nos.
4.	G.I. Tee ½”	18 Nos.
5.	G.I. Socket ½”	24 Nos.
6.	G.I. Union ½”	12 Nos.
7.	G.I. Lock Nut ½”	12 Nos.
8.	G.I. Elbow ¾”	18 Nos.
9.	G.I. Tee ¾”	06 Nos.
10.	G.I. Socket ¾”	08 Nos.
11.	Gate valve ½”	06 Nos.
12.	Gate valve ¾”	06 Nos.
13.	Check valve ¾”	06 Nos.
14.	Water meter	06 Nos.
15.	Ferule valve ½”	06 Nos.
16.	Wash basin	06 Nos.
17.	Basin brackets	06 Pairs
18.	Kitchen Sink 18” X 36”	02 Nos.
19.	Sink Mixer ½”	02 Nos.

20.	Pillar cock (swan type)	06 Nos.
21.	Rubber connection 18"	12 Nos.
22.	Copper connection pipe 18"	12 Nos.
23.	Stop cock ½"	48 Nos.
24.	Bib cock ½"	36 Nos.
25.	Flushing cistern (low level)	06 Nos.
26.	Shower Head ½"	06 Nos.
27.	Flushing cistern (high level) (cast iron)	02 Nos.
28.	PVC hockey pipe	12 Nos.
29.	PVC waste pipe	12 Nos.
30.	Waster coupling	06 Nos.
31.	Water closet (Indian type)	04 Nos.
32.	Water closet (English type)	04 Nos.
33.	P trap 4"	04 Nos.
34.	Cast iron pipe 4" size	24 ft
35.	Cast iron pipe 2" size	12 ft
36.	C.I cowl	06 Nos.
37.	C.I. Bend 2" & 4"	12 Nos.
38.	C.I Tee 2" & 4"	06 Nos.
39.	Lead	01 kg
40.	Asbestos Rope 3/8"	01 kg
41.	Threading tape	06 Nos.
42.	PVC pipe ½ " & ¾"	50 ft each
43.	Connection clamp with ¾" socket 4" size	06 Nos.

## **REFERENCE BOOKS**

- Instructor Manual & Trainee Manual
- G-III Level (Development Cell)
- Pipe Fitting & Plumbing (Ikhlaq Ahmed)
- Plumbing (J. Murphy) New English Book London
- Sheet Metal (Loe A Mayer) USA

## **EMPLOYABILITY OF PASS-OUTS**

The pass outs of this course may find job / employment opportunities in the following areas / sectors: -

- Hospitals
- Hotels
- Railways
- Cement Plants
- Sugar Mills
- Repair & Maintenance work shop
- All Mechanical / Civil work Industries & Chemical Industries etc.
- Sui Northern Gas
- Sui Southern Gas
- Oil & Gas Development Corporation
- L.D.A, M.D.A, F.D.A, D.D.A etc.

## **MINIMUM QUALIFICATION OF INSTRUCTOR**

- DAE in (Civil / Mechanical) Technology With 2-Years relevant experience.

OR

- Two Years certificate of Plumber & Pipe Fitter with 6-Years experience in relevant field.