

Curriculum of Matric Tech
Plumbing and Solar Water Heating System-I
GRADE X
2021



GOVERNMENT OF PAKISTAN
Ministry of Federal Education and Professional Training ISLAMABAD
In Collaboration with
National Vocational and Technical Training Commission.

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1.Introduction:

Pakistan is a developing country with 5th largest population in the world. More than 60% of our population is below 30 years of age which makes it second youngest country in South Asia. This “youth bulge” provides unique challenges as well as opportunities for the country’s social and economic development. The only remedy is to develop youth of Pakistan through education and training. To control the increasing un-employment, promoting entrepreneurship (self-employment), alleviate poverty and provide skilled manpower for industrial/economic growth, Govt. of Pakistan has emphasized to focus on Technical Scheme at SSC Level. For this, a stream of technical subjects has been selected including plumbing and solar water heating system as one of the elective subjects.

The construction industry, one of the leading industries in Pakistan, the Middle East and other parts of the world, offer a range of prosperous occupational areas, such as plumbing. Plumbers play a vital role in installing, repairing and maintaining pipes, fixtures and other plumbing used for water distribution and wastewater disposal in residential, commercial and industrial buildings. The increased use of solar energy has further added to the demand of Plumbers having the skills to install and maintain solar-thermal water heating systems. Thus, the ever-growing demand of industry has led to the design of this training Programme as a response to providing appropriate skills.

2.Rationale:

The construction industry is a profession that is increasingly getting attention in Pakistan, not only among the youth seeking to enter the industry but also among adults who wish to polish their skills to develop a career out of it.

On completing the curriculum, students should have acquired a set of knowledge and concepts, and have developed a range of technical, personal, interpersonal, organizational and generic skills, that can be applied in various contexts, both within and related to plumbing and solar water heating system. Furthermore, this course will stimulate the learners towards entrepreneurship in the industry

Within this qualification relating to plumbing interventions in schools, there are important interventions that integrated within school settings. The purpose of this qualification is to strengthen connections between schools and trade, and drawing on the concept of the sociotechnical network, theories the interactions between the relevant market and school contexts.

These programs have increased and continue to increase in popularity because they offer a valuable channel to engage with vulnerable groups via inclusive social activities, whilst positively impacting their lifestyle profiles.

Plumbing and Solar Water Heating System, Matric Tech (9th &10th)

3.Aims and Objectives:

Aims

The aim of this Programme is to make youth skillful who are competent to install, remove, check, repair, replace or service different types of bathrooms and kitchen fixtures, including solar water heating installations. In addition, this Programme aims to prepare youth to find employment in the construction industries or to enable them in becoming successful as entrepreneur in future.

Objectives:

After completion of training the trainees will be able to:

1. Identify plumbing materials, tools, equipment and fitting materials related to plumbing.
2. Handle plumbing related tools and equipment.
3. Identify and apply plumbing symbols.
4. Perform various bench work such as measuring, marking and filing.
5. Make various sizes of threads on galvanized iron pipes.
6. Join and connect G.I and PVC fittings.
7. Make various types of polyethylene fittings for joining the pipes.
8. Install various types of fixtures in private and public buildings.
9. Replace/repair and maintain the parts of installations and fixtures.
10. Prepare quantity estimates and costing.

Plumbing and Solar Water Heating System -I

(GRADE - X)

Plumbing and Solar Water Heating System-I (X)					
Chapter 1 (X)					
Ch.1 Introduction to G. I Pipes and Fittings			12 Periods (T= 06, P= 06)		
Theme/Content	Students' Learning Outcome	Activities/Practical	Duration	Tools	Workplace
Introduction to G.I pipes	The Students will be able to: <ul style="list-style-type: none"> Identify G.I pipes Identify different classes of G.I pipes. Observe the basic principle of G.I Pipes. 	<ul style="list-style-type: none"> Demonstrate G.I pipes as job per requirements. Classification of Pipes according to its function as per job requirements. 	02 Periods(T) (01 Hours ,20Min)	<ul style="list-style-type: none"> Multimedia or LED TV with good sound system. 	Classroom / Plumbing Lab
Introduction of G.I pipe fitting	The Students will be able to: <ul style="list-style-type: none"> Know about fitting and their names. Demonstrate fittings male and female parts. 	<ul style="list-style-type: none"> Demonstration of all fittings. Recognized fittings by their names Make sketches of all fittings. 	02 Periods(T) 02 Periods(P) (02 Hours ,40 Min)	<ul style="list-style-type: none"> All G.I fittings including male and female fittings. 	Classroom / Plumbing Lab
Purpose and uses of G.I pipe fitting	The Students will be able to: <ul style="list-style-type: none"> Learn purpose of fittings. Learn uses of all G.I fittings. Learn uses of male and female types of fitting. 	<ul style="list-style-type: none"> Demonstrate purpose of fittings. Practice on uses of all G.I fittings. 	02 Periods(T) 04 Periods(P) (04 Hours)	<ul style="list-style-type: none"> All G.I fittings including male and female fittings. 	Classroom / Plumbing Lab
Chapter 2 (X)					
Ch.2 Jointing of G.I pipes and Fittings			28 Periods (T = 10, P = 18)		
Theme/Content	Students' Learning Outcome	Activities/Practical	Duration	Tools	Workplace
Types of joints and their uses.	The Students will be able to: <ul style="list-style-type: none"> Know about joint types and there uses such as socket joint, union joint, threaded joint, coupling joint, long thread joint, Flange joints and welded joint. Knows uses of joint according to materials of pipes 	<ul style="list-style-type: none"> Practice on all types of joints. Practice on making joints of G.I Pipe such as socket, union, thread, coupling, long thread, Flange and welding joints. 	02 Periods(T) 04 Periods(P) (04 Hours)	<ul style="list-style-type: none"> G.I pipes, G.I fitting tools Pipe wrenches Adjustable wrenches Pipe vice. 	Class Room/ Plumbing Lab

	and nature of material flowing in pipes				
G.I Pipe joint with threading, socket long thread and coupling joints.	The Students will be able to: <ul style="list-style-type: none"> Knows about jointing with thread long thread, socket and coupling joints Knows about joint gaskets, packing material and jointing materials. 	<ul style="list-style-type: none"> Practice on all joints types such as socket joint long threading and Coupling joint. Practice with wrapping tap, threading and packing material for leak proof joint. 	02 Periods(T) 04 Periods(P) (04 Hours)	<ul style="list-style-type: none"> G.I pipe pieces with threading at ends. Sockets, couplings pipe wrench Screw wrench. Pipe wise. 	ClassRoom/ Plumbing Lab
G.I Pipe joint with union and flange plates.	The Students will be able to: <ul style="list-style-type: none"> Knows about jointing with union and importance of union joint. Knows about joining Pressure line with flange plates. 	<ul style="list-style-type: none"> Practice on G.I pipe with union fitting. Practice union fitting on fixed line. Practice with flange joint and gasket. 	02 Periods(T) 04 Periods(P) (04 Hours)	<ul style="list-style-type: none"> G.I pipe pieces with threading at ends. Union flange joint with gasket. pipe wrench Screw wrench. Pipe wise. 	Class Room/ Plumbing Lab
Provision of domestic connection.	The Students will be able to: <ul style="list-style-type: none"> Knows about joining house service line with main water supply line. Knows about joining socket clamp, gasket, ferrule valve and main line fittings. 	<ul style="list-style-type: none"> Practice of joining service line with main water supply line. Practice of fitting socket clamp its gasket, ferrule valve and required fittings of service line. 	02 Periods(T) 04 Periods(P) (04 Hours)		Class Room/ Plumbing Lab
Importance and detection of leakage in G.I pipe line.	The Students will be able to: <ul style="list-style-type: none"> Knows the importance of joints and damages caused by leakage. Know the procedure of detection of leakage in joints. 	<ul style="list-style-type: none"> Detection of leakage in joints. 	02 Periods(T) 02 Periods(P) (02 Hours ,40 Min)	All fittings used in jointing and packing material.	Class Room/ Plumbing Lab

Chapter 3 (X)

Ch.3 Installation of water supply fixtures and appliances

32 Periods (T = 10, P = 22)

Theme/Content	Students' Learning Outcome	Activities/Practical	Duration	Tools	Workplace
Introduction to water supply and sanitary appliances	The Students will be able to: <ul style="list-style-type: none"> State about meanings 	<ul style="list-style-type: none"> Presentations about concept of different 	01 Periods(T) 02 Periods(P) (02 Hours)	<ul style="list-style-type: none"> Multimedia or LED TV with good 	Class Room / Plumbing Lab

	<p>for installation of appliances.</p> <ul style="list-style-type: none"> • Understand the importance of appliances • Manage to change appliances • Understand the working procedures of different appliances 	<p>appliances used in water supply and sanitation.</p> <ul style="list-style-type: none"> • Groups' discussion / exercises about water supply and sanitation appliances • Differentiate between appliances used in different places. 		<p>sound system.</p>	
Scope and classification of appliances	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • Know about scope of appliances at Industry (Hotels, Accommodations). • Explore importance of appliances • know about different Types of water supply appliances. • know about different Types of sanitary appliances. • Familiarize with the house appliances specially. • Classify appliances by type, location and price. 	<ul style="list-style-type: none"> • Presentation about scope and importance of different appliances with its working • Group Presentation on different appliances. • Understanding about City center, Motels, Suburban hotels, Airport hotels, Resort hotels, Floating hotels, and specific clientele. • Group Presentation on hotel classification with examples. 	<p>01 Periods (T) 02 Periods (P) (02 Hours)</p>	<ul style="list-style-type: none"> • Multimedia or LED TV with good sound system, • Computer • Whiteboard. 	<p>Class Room / Plumbing Lab</p>
Install centrifugal pump with supply pipes	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • Isolate services. • Carry out electric safety check (if required) • Loose unions • Disconnect and remove pump from foundation • Reconnect pump to existing services. • Check for leakage. • Check level of pump at foundation 	<ul style="list-style-type: none"> • Identified services workplace • Adopt procedures, • Fix appliance • Apply gas pressure • Check leakage • Adopt work health and safety (WHS) • Check environmental requirements. 	<p>01 Period (T) 03 Period (P) (02 Hours ,40 Min)</p>	<ul style="list-style-type: none"> • Pipe wrench • Screw driver • Screw wrench • PPEs • Threading Die • Cutter • Plier • Drill machine • Hacksaw. • Plumber's torch • Nose plier 	<p>Class Room / Plumbing Lab</p>

Install gas sub-meter	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • Check gas pressure • Understand specification • Uninstall existing gas meter • Install new gas meter 	<ul style="list-style-type: none"> • Create required material list • Select Gas sub-meter • Test and purge installation. • Open gas pressure • Check for working • Check for leakage 	01 Periods (T) 03 Periods (P) (02 hours 40 Min)	<ul style="list-style-type: none"> • Pipe Wrench • Screw driver • Screw wrench, • PPEs • Nose plier • Threading Die, • Cutter • Plier • Drill Machine • Hacksaw. • Plumber's torch. 	Class Room / Plumbing Lab
Install storage tank	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • Identify tank • Check water pressure • Shut down valve • Locate position for installation • Replace pipe with fittings 	<ul style="list-style-type: none"> • Create required material list • Select size of tank • Select direction of tank • Fixed with unions • Test pipe pressure. • Test joint leakage • Check for working 	01 Periods (T) 04 Periods (P) (3Hour ,20 Min)	<ul style="list-style-type: none"> • Pipe Wrench • Screw driver • Screw wrench • PPEs • Threading Die • Cutter, • Plier, Drill Machine, • Hacksaw. • Plumber's torch. 	Class Room / Plumbing Lab
Install Geyser (Electric & Gas)	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • Identify Geyser • Check water pressure • Shut down valve • Locate position for installation • Fix union for inlet and out let pipes • Fix pipes connection for hot and cold water 	<ul style="list-style-type: none"> • Drill in wall at measured Hight • Fix Bolt Kits • Fix cock at entire Hight • Fix coupling for shower • Check leakage • Check fixing level 	02 Periods (T) 03 Periods (P) (3Hour ,20 Min)	<ul style="list-style-type: none"> • Pipe Wrench • Screw driver • Screw wrench • PPEs • Threading Die • Cutter • Plier • Drill Machine • Hacksaw. • Plumber's torch. 	Class Room / Plumbing Lab

Install Water Cooler or Dispenser	The Students will be able to: <ul style="list-style-type: none"> • Identify Water Cooler or Dispenser • Check water pressure • Shut down valve • Locate position for installation • Fix union for inlet and out let pipes • Check drain pipes 	<ul style="list-style-type: none"> • Drill in wall at measured Hight for electric panel • Fix cock at entire Hight for inlet pipe • Fix coupling • Check leakage • Check fixing level 	02 Periods (T) 03 Periods (P) (3 Hour ,20 Min)	<ul style="list-style-type: none"> • Pipe Wrench • Screw driver • Screw wrench • PPEs • Threading Die • Cutter • Plier • Drill Machine • Hacksaw. • Plumber's torch. 	Class Room / Plumbing Lab
Clean up.	The Students will be able to: <ul style="list-style-type: none"> • Clear the work area, • dispose extra materials in accordance with state and territory legislation and workplace policies and procedures. 	<ul style="list-style-type: none"> • Performed workplace clean. • Check hygiene practices as per standards. • Clean all tools • Place tools at appropriate place 	01 Period (T) 02 Period (P) (02 Hours)	<ul style="list-style-type: none"> • Duster, • Wire brush • Sponge • Wiper • Cloth • Cotton 	Class Room / Plumbing Lab

Chapter 4 (X)

Ch:4 Sanitary Pipes and Fitting

26 Periods (10 =T, 16= P)

Theme/Content	Students' Learning Outcome	Activities/Practical	Duration	Tools	Workplace
Introduction to sanitary pipes and fittings	The Students will be able to: <ul style="list-style-type: none"> • State about meanings for installation of pipes. • State about meanings for installation of fittings. • Understand the importance of pipes • Manage to change fittings • Understand the working procedures of different fittings 	<ul style="list-style-type: none"> • Presentation about concept of different pipes and fittings. • Groups' discussion / exercises about wastewater pipes fittings • Differentiate between sanitary pipes and sanitary fittings. 	01 Periods(T) 01 Periods(P) (1 Hour, 20 Min)	<ul style="list-style-type: none"> • Multimedia or LED TV with good sound system. • Computer 	Classroom / Plumbing Lab
Scope and classification of sanitary pipes	The Students will be able to: <ul style="list-style-type: none"> • Know about scope of 	<ul style="list-style-type: none"> • Presentation about scope and importance of 	02 Periods (T) 01 Periods (P) (2Hour ,00 Min)	<ul style="list-style-type: none"> • Multimedia or LED TV with good 	Classroom/ Plumbing Lab

and fittings	<p>pipes at Industry (Hotels, Accommodations).</p> <ul style="list-style-type: none"> • Explore importance of sanitary fittings • know about different Type of sanitary pipes. (concrete, cast iron, PVC etc.) • know about different Types of sanitary fittings. • Classify pipes by type, location and price. • Classify fittings by type, location and price. 	<p>different sanitary pipes and fittings</p> <ul style="list-style-type: none"> • Group Presentation on different sanitary pipes. • Group Presentation on different sanitary fittings 		<p>sound system</p> <ul style="list-style-type: none"> • Computer 	
Install Vent pipes	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • Identify vent pipe. • Carry out joint with waste pipe • Check nuisance • Connect with clamp • Check leakage at joint. • Check level of vent pipe • Understand specification 	<ul style="list-style-type: none"> • Identified services workplace • Create required material list • Adopt procedures, • Fix vent pipe • Adopt work health and safety (WHS) • Check environmental requirements. 	<p>01 Period (T) 02 Period (P) (02 Hours ,00 Min)</p>	<ul style="list-style-type: none"> • Pipe Wrench • Screw driver • Screw wrench • PPEs • Threading Die • Cutter • Plier • Drill Machine • Hacksaw. • Plumber's torch • Nose plier 	Classroom / Plumbing Lab
Install / Lay waste pipe for sink / wash hand basin	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • Check gas pressure • Understand specification • Excavate ground at level and width according to diameter of pipe • Compact the excavated ground • Lay pipe and check gradient • Jointing the pipes 	<ul style="list-style-type: none"> • Create required material list • Select tools • Check slope of pipe • Check for leakage 	<p>01 Period (T) 02 Period (P) (02 Hours ,00 Min)</p>	<ul style="list-style-type: none"> • Pipe Wrench • Screw driver • Screw wrench • PPEs • Nose plier • Threading Die • Cutter • Plier • Drill Machine 	Classroom/ Plumbing Lab

				<ul style="list-style-type: none"> • Hacksaw. • Plumber's torch. 	
Install “Y” in waste pipe	The Students will be able to: <ul style="list-style-type: none"> • Identify Y-fitting • Identify waste pipe • Check water pressure • Shut down valve • Locate position for installation • Check joint position 	<ul style="list-style-type: none"> • Create required material list • Select size of pipe • Select direction of pipe • Check gradient • Test joint leakage • Check for working 	01 Period (T) 02 Period (P) (02 Hours ,00 Min)	<ul style="list-style-type: none"> • Pipe Wrench • Screw driver • Screw wrench • PPEs • Threading Die • Cutter • Plier • Drill Machine • Hacksaw • Plumber's torch. 	Classroom/ Plumbing Lab
Install “Y” in vent pipe	The Students will be able to: <ul style="list-style-type: none"> • Identify Y-fitting • Check gas • Locate position for installation • Fix Y with clamps • Fix pipes with Y-Fitting 	<ul style="list-style-type: none"> • Drill in wall at measured Hight • Fix Bolt kit • Fix clamp with bolt kit • Check for working • Check fixing level 	01 Period (T) 02 Period (P) (02 Hours ,00 Min)	<ul style="list-style-type: none"> • Pipe Wrench • Screw driver • Screw wrench • PPEs • Threading Die • Cutter • Plier • Drill Machine • Hacksaw. • Plumber's torch. 	Classroom/ Plumbing Lab
Install Socket with waste pipe	The Students will be able to: <ul style="list-style-type: none"> • Identify socket • Check waste water pressure • Locate position for fixing socket • Fix appropriate joint 	<ul style="list-style-type: none"> • Identify task points • Fix socket with proper joint • Check leakage • Check fixing level 	01 Period (T) 02 Period (P) (02 Hours ,00 Min)	<ul style="list-style-type: none"> • Pipe Wrench • Screw driver • Screw wrench • PPEs • Threading Die • Cutter • Plier • Drill Machine • Hacksaw. 	Classroom/ Plumbing Lab

				<ul style="list-style-type: none"> Plumber's torch. 	
Install hockey pipe with flushing cistern	The Students will be able to: <ul style="list-style-type: none"> Identify hockey pipe Check waste water pressure Locate position for fixing pipe Fix appropriate joint Check proper working 	<ul style="list-style-type: none"> Identify task points Fix fitting with proper joint Check leakage Check fixing level 	01 Period (T) 02 Period (P) (02 Hours ,00 Min)	<ul style="list-style-type: none"> Pipe Wrench Screw driver Screw wrench PPEs Threading Die Cutter, Plier Drill Machine Hacksaw. Plumber's torch. 	Classroom/ Plumbing Lab
Clean up.	The Students will be able to: <ul style="list-style-type: none"> Clear the work area, dispose extra materials in accordance with state and territory legislation and workplace policies and procedures. 	<ul style="list-style-type: none"> Performed workplace clean. Check hygiene practices as per standards. Clean all tools Place tools at appropriate place 	01 Period (T) 02 Period (P) (02 Hours ,00 Min)	<ul style="list-style-type: none"> Duster, Wire brush, Sponge Wiper Cloth Cotton 	Classroom / Plumbing Lab
Chapter 5 (X)					
Ch:5 Waste Water Fitting			22 Periods (T = 10, P = 12)		
Theme/Content	Students' Learning Outcome	Activities/Practical	Duration	Tools	Workplace
Introduction to waste water fittings	The Students will be able to: <ul style="list-style-type: none"> Know about meanings for waste water sanitary fittings. Understand the importance of fittings Manage to change the fittings Understand the working procedures of different fittings 	<ul style="list-style-type: none"> Presentations about concept of different waste water fittings Groups' discussion / exercises about waste water fittings Differentiate between fittings used in different places. 	01 Periods(T) 01 Periods(P) (01 Hours,20 Min)	<ul style="list-style-type: none"> Multimedia or LED TV with good sound system. 	Classroom / Plumbing Lab
Scope and classification	The Students will be able to:	<ul style="list-style-type: none"> Presentation about scope and 	01 Periods(T) 01 Periods(P)	<ul style="list-style-type: none"> Multimedia or LED TV 	Classroom/ Plumbing

of waste water fittings	<ul style="list-style-type: none"> • Know about scope of fittings at Industry (Residence and Hotels Accommodations). • Explore importance of waste water fittings • know about different Types of waste water fittings. • know about different Types of fittings as price. • Familiarize with the house fittings specially. • Classify appliances by type and location. 	<p>importance of different fittings with its working</p> <ul style="list-style-type: none"> • Differentiate fittings between waste water and fresh water • Group Presentation on different waste water fittings. • Understanding between waste water and its fittings. • Group Presentation on fittings at home • Group discussion on classification of waste water fittings. 	(01 Hours, 20 Min)	with good sound system.	Lab
Install coupling / socket	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • Identify coupling • Identify Sockets • Check waste pressure • understand specification • Uninstall existing socket • Install new fitting (socket) between • Differentiate between coupling and sockets 	<ul style="list-style-type: none"> • Create required material list • Select socket /coupling. • Use proper jointing material • Open pressure • Check for working. • Check for leakage. 	01 Periods (T) 02 Periods (P) (02 hours ,00 Min)	<ul style="list-style-type: none"> • Compute • Multimedia • Whiteboard • Pipe Wrench • Screw driver • Screw wrench • PPEs • Threading Die • Cutter • Plier 	Classroom/ Plumbing Lab
Install Tee and Elbow	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • Identify Tee & Elbow • Check pressure • Shut down valve for water supply • Uninstall existing fittings • Replace fittings with new one • Adopt proper method • Use work health and safety (WHS) and 	<ul style="list-style-type: none"> • Create required material list • Select pipe for replace • Test pipe pressure / discharge • Drilling / excavation for fixing pipe • Check for working 	02 Periods (T) 02 Periods (P) (02 hours,20 Min)	<ul style="list-style-type: none"> • Multimedia or LED TV with good sound system. • Computer • Whiteboard • Pipe wrench • Screw driver • Screw wrench • PPEs 	Classroom/ Plumbing Lab

	environmental requirements.			<ul style="list-style-type: none"> • Threading Die • Cutter • Plier • Hack Saw 	
Install “Y” and Cross	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • Identify Y & Cross • Check waste water pressure • Shut down valve of water supply • Locate position for installation • Replace pipe with fittings • Identify workplace • Differentiate between “Y” and Cross • Select procedures, Use work health and safety (WHS) and environmental requirements. 	<ul style="list-style-type: none"> • Create required material list • Select size of pipe • Select size of fitting • Select direction of fitting • Fixed with jointing materials • Test pipe pressure. • Test joint leakage • Check for working 	02 Periods (T) 02 Periods (P) (02 hours,20 Min)	<ul style="list-style-type: none"> • Pipe Wrench • Screw driver • Screw wrench • PPEs • Cutter • Threading Die • Cutter • Hack Saw • Drill Machine • Threading Die Cutter • Plier • Hack Saw. 	Classroom/ Plumbing Lab
Install Waste pipe	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • Identify waste pipe • Identify workplace • Check waste pressure • Locate position for installation • Replace pipe with fittings • Fix new pipe with proper joint and fittings • Check for proper working (waste flow) • Check depth for waste pipe • Calculate earth work • Locate position for waste pipe 	<ul style="list-style-type: none"> • Create required material list • Select size of pipe • Select size of fitting • Select direction of pipe • Fixed with jointing materials. • Identify tools • Test pipe pressure. • Test joint leakage 	02 Periods (T) 02 Periods (P) (02 hours,20 Min)	<ul style="list-style-type: none"> • Pipe Wrench • Screw driver • Screw wrench • PPEs • Cutter • Plier • Threading Die • Plier • Cutter • Hack Saw • Drill Machine. 	Classroom/ Plumbing Lab
Clean up.	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • Clear the work area, 	<ul style="list-style-type: none"> • Performed workplace clean. • Check hygiene 	01 Period (T) 02 Period (P) (02 Hours)	<ul style="list-style-type: none"> • PPEs Kits • Duster • Wire brush 	Classroom/ Plumbing Lab

	<ul style="list-style-type: none"> dispose extra materials in accordance with state and territory legislation Adopt workplace policies and procedures. 	<p>practices as per standards.</p> <ul style="list-style-type: none"> Clean all tools Place /store tools at appropriate place 		<ul style="list-style-type: none"> Sponge Wiper Cloth cotton 	
Chapter 6 (X)					
Ch: 6 Waste Water Fixtures			29 Periods (T = 14, P = 15)		
Theme/Content	Students' Learning Outcome	Activities/Practical	Duration	Tools	Workplace
Introduction and installation of fixtures	<p>The Students will be able to:</p> <ul style="list-style-type: none"> Know about meanings for installation of sanitary fittings and fixtures. Understand the importance of appliances. Manage to change fixtures. Understand the working procedures of different fixtures 	<ul style="list-style-type: none"> Presentations about concept of different fixtures used for sanitation. Groups' discussion / exercises about sanitation fixtures Differentiate between appliances and fixtures. 	02 Periods(T) 01 Periods(P) (02 Hours, 00 Min)	<ul style="list-style-type: none"> Multimedia or LED TV with good sound system. Computer Whiteboard with markers. 	Classroom/ Plumbing Lab
Scope and classification of waste water fixtures	<p>The Students will be able to:</p> <ul style="list-style-type: none"> Know about scope of fixtures at Industry (Hotels and Accommodations). Explore importance of fixtures know about different Types of fixtures Types of sanitary fixtures according to working, location and materials Types of sanitary fixtures according to working their price. 	<ul style="list-style-type: none"> Presentation about scope Presentation about importance of fixtures Group Presentation on different fixtures. Explore about fixtures materials and types. Understanding about fixtures cost and working Group Presentation on fixtures with its classification with examples. 	02 Periods(T) 01 Periods(P) (02 Hours, 00 Min)	<ul style="list-style-type: none"> Multimedia or LED TV with good sound system. Computer Whiteboard with markers. 	Classroom / Plumbing Lab
Install Traps (Floor & Gully Trap)	<p>The Students will be able to:</p> <ul style="list-style-type: none"> Identify Traps Identify workplace 	<ul style="list-style-type: none"> Practice for Installation of Traps (Floor & Gully Trap) 	02 Periods(T) 01 Periods(P) (01 Hours, 20 Min)	<ul style="list-style-type: none"> Multimedia or LED TV with good sound 	Classroom/ Plumbing Lab

	<ul style="list-style-type: none"> • Adopt safety policies • Select procedures, • Use work health and safety (WHS) and environmental requirements. • Check manufacturer's specifications • Check sewage pressure • Check depth for trap • Calculate earth work • Locate position for trap 			<ul style="list-style-type: none"> • Pipe Wrench • Screw driver • Screw wrench • PPEs • ThreadingDie • Cutter • Plier • Drill Machine 	
Install W.C. (Indian & English)	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • Identify W.C. • Apply workplace policies • Adopt procedures, • Isolate services. • Locate place • Fix trap • Fix W.C. • Check Level • Pour concrete around W.C. 	<ul style="list-style-type: none"> • Practice for Installation of W. Cs (Indian & English) 	02 Periods(T) 02 Periods(P) (02 Hours, 40 Min)	<ul style="list-style-type: none"> • Multimedia or LED TV with good sound system. • Pipe Wrench • Screw driver • Screw wrench • PPEs • ThreadingDie • Cutter • Plier • Drill Machine 	Classroom/ Plumbing Lab
Install Sink.	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • Identify Sink. • Apply workplace policies • Adopt procedures, • Locate place • Fix stands in wall • Fix bolt kits • Check Level 	<ul style="list-style-type: none"> • Practice for Installation of Sink. 	01 Period (T) 02 Period (P) (02 Hours)	<ul style="list-style-type: none"> • Multimedia or LED TV with good sound system. • Pipe Wrench • Screw driver • Screw wrench • PPEs • ThreadingDie • Cutter • Plier • Drill Machine 	Classroom/ Plumbing Lab

Install wash hand basin	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • Identify wash hand basin • Check water pressure • Shut down valve • Locate position for installation • Identify workplace • Adopt safety policies • Select procedures • Use work health and safety (WHS) and environmental requirements. • Use proper tools • Check manufacturer's specifications 	<ul style="list-style-type: none"> • Practice for Installation of wash hand basin 	02 Periods (T) 03 Periods (P) (3 Hours, 20 Min)	<ul style="list-style-type: none"> • Multimedia or LED TV with good sound system. • Pipe Wrench • Screw driver • Screw wrench • PPEs • Threading Die • Cutter • Plier • Drill Machine 	Classroom/ Plumbing Lab
Install Bath Tub	<p>The learner will be able to:</p> <ul style="list-style-type: none"> • Identify workplace • Adopt safety policies • Select procedures, • Use work health and safety (WHS) and environmental requirements. • Use proper tools • Check manufacturer's specifications • Use PPEs • Check water pressure • Shut down valve • Locate position for installation • Fix bath tub • Check level 	<ul style="list-style-type: none"> • Practice for Installation of bath tub. 	02 Periods (T) 03 Periods (P) (03 Hours, 20 Min)	<ul style="list-style-type: none"> • Computer • Multimedia • Pipe Wrench • Screw driver • Screw wrench • PPEs • Threading Die • Cutter • Plier • Drill Machine • Hacksaw. • Plumber's torch. 	Classroom/ Plumbing Lab
Clean up.	<p>The learner will be able to:</p> <ul style="list-style-type: none"> • Clear the work area after performing complete task. • Dispose extra materials in accordance with state and territory 	<ul style="list-style-type: none"> • Performed workplace clean. • Check hygiene practices as per standards. • Clean all tools • Place tools at appropriate place 	01 Period (T) 02 Period (P) (02 Hours)	<ul style="list-style-type: none"> • Duster, • Wire Brush • Sponge • Wiper • Cloth • Cotton 	Classroom/ Plumbing Lab

	legislation and workplace policies and procedures.				
Chapter 7 (X)					
Ch.7 Testing of Sanitary Pipes		15 Periods (T = 06, P = 09)			
Theme/Content	Students' Learning Outcome	Activities/Practical	Duration	Tools	Workplace
Carry out initial preparatory activities.	The learner will be able to: <ul style="list-style-type: none"> • Access relevant job instructions from learning information management system (LIMS). • Prepare and workplace for task • Assemble / collect all required equipment and materials • Plan task / work sequences for optimum efficiency 	<ul style="list-style-type: none"> • Carry out initial preparatory activities. 	02 Periods(T) 03 Periods(P) (03 Hours ,20 Min)	<ul style="list-style-type: none"> • Timer • Measuring tape • Safety glasses • leakage testing machine • File set • Gloves • Helmet • Pipe 	Class Room / Plumbing Lab
Leakage Detection Test by smoke.	The learner will be able to: <ul style="list-style-type: none"> • Identify the specimen • Identify leakage testing machine • Detect the leakage of smoke. 	<ul style="list-style-type: none"> • Perform Leakage Detection Test by smoke. 	02 Periods(T) 03 Periods(P) (03 Hours 20 Min)	<ul style="list-style-type: none"> • Pipe • Measuring tape • Safety glasses • leakage testing machine • File set • Gloves • Helmet 	Class Room / Plumbing Lab
Leakage Detection Test by water	The learner will be able to: <ul style="list-style-type: none"> • Identify the specimen • Identify leakage testing machine • Evaluate the amount of leakage of water. 	<ul style="list-style-type: none"> • Perform Leakage Detection Test by water. 	02 Periods(T) 03 Periods(P) (03 Hours 20 Min)	<ul style="list-style-type: none"> • Pipe • Measuring tape • Safety glasses • leakage testing machine • File set • Gloves • Helmet 	Class Room / Plumbing Lab
Chapter 8 (X)					
Ch.8 Entrepreneurship		16 Periods (T = 06, P = 10)			

Theme/Content	Students' Learning Outcome	Activities/Practical	Duration	Tools	Workplace
Introduction to Entrepreneurship	<p>The Students will be able to:</p> <ul style="list-style-type: none"> • define entrepreneurship • know key concepts of entrepreneurship. • understand main component of entrepreneurship. 	<ul style="list-style-type: none"> • Develop a small business model • Exposure to successful entrepreneur from hospitality 	02 Periods(T) 04 Periods(P) (04 Hours ,00 Min)	<ul style="list-style-type: none"> • Multimedia or LED TV with good sound system. 	Classroom
Feasibility and Business Plan	<p>The learner will be able to:</p> <ul style="list-style-type: none"> • know how to identify business opportunity. • know how to develop Feasibility and Business Plan. • prepare a business plan. 	<ul style="list-style-type: none"> • Design a Business plan keeping in view of your own skills. 	02 Periods(T) 04 Periods(P) (04 Hours ,00 Min)	<ul style="list-style-type: none"> • Multimedia or LED TV with good sound system. 	Classroom
Marketing and Marketing Mix	<ul style="list-style-type: none"> • learn about concept of marketing and marketing mix • understand 6P's of marketing • calculate costing and pricing 	<ul style="list-style-type: none"> • Develop a marketing strategy for your business model developed under first topic of this chapter. 	02 Periods(T) 02 Periods(P) (02 Hours ,40 Min)	<ul style="list-style-type: none"> • Multimedia or LED TV with good sound system. 	Classroom

5.Assessment and Evaluation:

Assessment is the practice of collecting evidence of student learning. It aims at improving learning and teaching as well as recognizing the achievement of students. It determines students

'progression through their learning experiences and enables them to demonstrate that they have achieved the intended learning outcomes. The assessment is aligned with curriculum aims, design and learning processes.

Evaluation is an integral part of teaching-learning process. It involves gathering information through various assessment techniques, making valuable judgment and sound decisions. Assessment provides information and teaching about students' achievement in relation to learning objectives. With this information, the teacher makes informed decisions about what should be done to enhance the learning of students or to improve teaching methods. Assessment must be:

- mainly open-ended, allowing for discussion and revision of new understanding.
- tolerant of divergent thinking of students and promote the notion of no "one right answer".
- presented in alternative mode, not just paper-and-pencil responses to limiting questions.
- designed to foster analysis, comparison, generalization, prediction, and modification according to the grade and development level.
- capable of promoting collaboration and team effort in demonstration of competence.
- ongoing and cumulative, showing growth over time.

Formative (Internal) Assessment:

Internal assessment refers to the assessment practices employed as part of the learning and teaching process. It is an ongoing process throughout the session and uses Test — Feedback — Adjust cycle repeatedly to improve students' performance and efficiency in learning and teaching. In designing internal assessment for the subject, teachers should maintain a proper balance between the formative and summative functions of assessment. It should be comprehensive to cover all the objectives as per curriculum. A diversity of assessment modes should be adopted so that students are given opportunities to develop and demonstrate the full range of learning outcomes of the curriculum, including those of knowledge, skills and values and attitudes.

Methods for Internal/Formative Assessment:

Following tasks can help in formative assessment.

- Assignments
- Quizzes
- Tests
- Group discussions
- Oral/multimedia presentations
- Worksheets
- Online interactive activities
- Role play
- Demonstration
- Practical exercises

Feedback on students' work in all the above tasks must be prompt, effective, and efficient assessment should have questions setting that specifically help in finding out knowledge, understanding and skills.

Summative /External Assessment

Summative assessment will be managed by concerned Board of Intermediate and Secondary Education. It will be composed of two parts.

- 1) **Theory Assessment /Written examination:** The theory examination is suggested to consist of a wide variety of questions. Its overall weight age should be 40 %. It should be based on the curriculum rather than textbook. The assessment should be designed to examine the candidate's understanding of the whole syllabus and should test the range of abilities according to Bloom Taxonomy.
- 2) **Practical Assessment/Practical examination:** This is designed to test Practical skills of students. Its overall weight age should be 60%.

A standards-referenced approach will be adopted for grading and reporting student performance. The purpose of this approach is to recognize what each student can do in the subject at the end of the 2-year secondary school level education. The performance of each student will be matched against a set of performance standards, rather than comparing to the performance of other students. It makes the implicit standards explicit by providing specific indication of individual student performance. Descriptions will be provided for the set of standards.

6.Guidelines for Writing a Textbook:

A textbook is an important teaching and learning resource and one of the most extensively used resources in classrooms. To reflect national needs and aspirations the needs and aspirations, the textbooks should be written in accordance with this curriculum. This curriculum meets not only the general aims and objectives but also fulfills the specific requirements of the individual subject. As the textbook serves as a framework for teaching, the author/authors should consider the following features:

- A textbook must include an introduction to the textbook, explaining how to use the textbook
- The textbook must be in line with the National Curriculum, covering all SLOs of each theme or concept.
- Content and illustrations must be culturally, contextually and age appropriate.
- All text and material must be accurate, up-to-date and error-free.
- The continuity of the concepts, their integration and logical development should be ensured.
- Horizontal and vertical overlapping of the concepts should be avoided.
- The textbook should be informative and interactive with questions to be put at suitable intervals to provoke the students to think.
- The language used should be simple, clear, straight forward, unambiguous, and easily comprehensible by the students of the level.
- Simple questions may be asked within the chapter, which requires students to recall, think, and apply what they have just learnt as well as to reinforce the learning of the concepts and principle.
- The examples and applications should be from everyday life and be supportive of our cultural values.

- Photographs and illustrations should be clear, labeled, and supportive of the text. Tables, flow charts and graph may be given wherever needed.
- Key points at the end of each chapter should provide a summary of the important concepts and principles discussed in the chapter.
- End-of-the-Chapter exercises must include a variety of assessment styles based on levels of Bloom's Taxonomy. These should encourage students to think, develop skills, and use information for a variety of purposes.
- Textbooks should be free from all kinds of biases including, gender, religion, occupation, social background etc.
- To make the students self-learner use of IT based resources may be encouraged. Relevant internet links and other online resources may be included.
- Glossary of the new vocabulary must be included.

7.Guideline for planning and writing a chapter:

The textbook author may decide the titles of each chapter and can choose to cover students' learning outcomes (SLOs) from any themes in developing the content of the chapter. The textbook author must also keep in mind that a number of SLOs cannot be addressed in the text (as if this is done it would lead students to simply memorize the text and not serve the realization of the curriculum). These SLOs could be realized through questions and practical activities within and at the end of the chapter exercises.

- Learning outcomes must be given at beginning of each chapter.
- Decide on key ideas, facts, concepts, skills, and values that can be developed.
- Illustrations must clearly convey the desired concept.
- Activities must demand from students to do inquiry and problem solving according to grade level.
- Ensure that the content is up to date, accurate and developmentally appropriate.
- Contents must be in line with chapter outcomes.
- Language must be consistent, culturally appropriate, and grammatically correct (as if talking to a group).
- Language must engage and hold reader's attention.
- Recall previous learning, where possible.
- Structure the writing so that the sentence is simple, paragraphs deal with single ideas etc.
- Interesting information in the form of tidbits, fact file, point to ponder etc. must be given.
- Write a summary/concept map at end of each chapter, reviewing key knowledge and skills.
- End-of-chapter exercises
- Recall and integrate previous learning
- Engage students and develop their creativity
- Move from lower to higher order thinking
- Focus on multiple intelligences
- Keep the text contextually relevant in line with local teaching and learning.
- Provide website links for further research.

8. Guidelines for Writing Learner Workbook:

Workbooks are books that contain writing activities and exercises that build upon each chapter in the textbook. Workbook exercises help students to develop conceptual understanding of the concepts dealt with in the text, to develop skills and to apply knowledge to new situations. Basic features of a workbook A workbook should have:

- Various exercises and activities for each chapter, topic, subtopic.
- Exercises and activities that will enable student to develop and practice the content knowledge, skills and higher order thinking.
- Accurate and variety of exercises.
- Clear illustrations/ examples/ explanations to show what students are supposed to do, and/or what product looks like.
- Exercises and activities with a variety of purposeful, stimulating, challenging and innovative items to encourage students to review and practice the knowledge and skills they have learnt.
- Exercises that include both constructed and restricted response items.
- Activities, which requires readily available, acceptable, and affordable materials and resources.

9. Basic Requirements for Plumbing Lab (Tools/Equipment):

1. Adjustable wrench 6",8",12"
2. Pipe Bender Machine Hydraulic complete set
3. Chisel set
4. Trowel
5. Electric Drill machine (hammering with healti)3/4"
6. Die (Ratchet), Die Fix 1/2,3/4,1,2
7. Tape and Die.
8. Extension board 10-meter 2 core
9. First Aid box
10. Gloves lather,rubber
11. Safety goggles Plastic, glass
12. Hand Electric Grinder Electric Wall Cutter
13. Grip plier 10"
14. Hammer 250gm,500gm,1000gm,1500gm,2000gm
15. Hand bit 1/4", 3/8"
16. Helmet ABS Material
17. Hacksaw 12" with blade
18. Spirit Level 6",12",8"
19. L-key set Star L key Set
20. Measuring tape 3meter ,10 meter
21. Pipe wrench ,10",12",14",18"
22. Plier
23. Long nose plier.
24. Pipe cutter (1/2"- 2")
25. PPRC Heater 750W to 1000W
26. PPRcutter
27. G.I cutter.

28. Tubing cutter.
29. Safety boots (Shoes)
30. Screw driver set (6",8",10",12")
31. Spanner set (6mm to 24mm)
32. Line testing pump (leakage) (Hand type)
33. Tools box iron+3 draws
34. Torch Chargeable
35. Vice with iron stand(2nos)
36. Compass Spring type 8"
37. Solar Water Heater (Complete Set) Different denominations with different types i.e., pressurized and gravity based thermosyphon.
38. Water Filling Pumps Centrifugal pump ½" Reciprocating 1/2
39. Pipe Insulation Material
40. Caulking tools.
41. Ladle
42. Melting pot.
43. Bench Vice 5" with bench
44. Oil Can
45. Center Punch
46. Hand bit tool
47. Wire Brush
48. Broom.
49. Vernier caliper.
50. Hand grinder.
51. Pipe Reamer
52. Gi Pipe (½",3/4",1")
53. Gi fitting ½",3/4",1" (Elbow, tee, socket etc.)
54. PPRC pipe 25mm,32mm
55. PPRC fitting 25mm,32mm
56. PVC pipe 2",3",4"
57. UPVC 2",3",4"
58. P trap 4"
59. Solution PVC
60. All types of valves ½",3/4",1"
61. Plastic Pipe ½",3/4",1"

10. Curriculum Development Committee :

The following members participated in the Curriculum development Committee:

SN.	Name	Designation	Organization
1.	Engr. Azhar Iqbal	Principal	GCT, Raiwind Road, Lahore.
2.	Mr. Imtiaz Awan	Sr. Instructor	, GCT Rasul, Mandi Bahauddin.
3.	Mr. Amjad Rafique	Principal,	GCT Rasul, Mandi Bahauddin.
4.	Engr. Arsalan Hameed Khan	Assistant Manager	P & P Department, LWMC, Lahore.
5.	Engr. Rebab Maria Mehmood	Site Engineer,	IMC, Lahore.
6.	Mr. Adnan Shaukat	Instructor,	FIT, Rawalpindi.
7.	Mr. Inam Ul Haq	Instructor,	CTTI, Islamabad.
8.	Muhammad Nasir Khan	DACUM Facilitator	Islamabad.