LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

PLUMBER (General)

Class XI and XII

COUNCIL OF HIGHER SECONDARY EDUCATION, ODISHA
C-2, Prajnapitha, Samantarapur, Bhubaneswar, 751013

COURSE OVERVIEW –

COURSE OVERVIEW: Plumber – General is an important job in installing and repairing plumbing fittings and fixtures. A Plumber- General is responsible for installation, major repair, maintenance and servicing of pipes and sanitary fixtures in housing, Industrial, commercial and institutional setups as well as on special work. The person should be able to work independently on the assignment. The person should be comfortable in performing laborious work, should be a good listener, good at taking and following instructions, a good team player and result oriented with positive attitude.

COURSE OUTCOMES: On completion of the course, students should be able to:

1. Communicate effectively with the customers;
2. Identify the principal components of a computer system.
3. Identify and control hazards in the workplace that pose a danger or threat to their safety or health, or that of others.
4. Demonstrate self-management skills.
5. Demonstrate the ability to provide a self-analysis in context of entrepreneurial skills and abilities.
6. Demonstrate the knowledge of the importance of green skills in meeting the challenges of sustainable development and environment protection.
7. Identify and demonstrate safe use of hand and power tools/equipment used in plumbing;
8. Gain insight into Plumber -General job role and its career progression.
9. Do installation of basic sanitary fixtures in housing, commercial and institutional setups.
10. Do repairing of basic plumbing systems, repair of pipes and sanitary fixtures in housing, commercial and institutional setups.
11. Maintenance and servicing of plumbing systems in housing, commercial and institutional setups.
12. Coordinating with the senior and other working team about communicating with colleagues and seniors in order to achieve smooth and hazard free work flow.
13. Maintaining a healthy, safe and secure working environment.
14. Work effectively in a team to deliver results at a Plumbing site

CLASS XI – PAPER I (FULL MARKS: 100)

	Units	No. of Theory classes (In Hours)	No. of Practical Classes (In Hours)	Max Marks
Part A	Employability Skills			
Unit 1	Communication Skills–I	04	05	10
Unit 2	Self-management Skills–I	03	05	
Unit 3	Entrepreneurial Skills–I	03	05	
	Total (A)	10	15	10

Part B	Vocational Skills			
Unit 4	Introduction to the sector and the job role	08	108	40
Unit 5	Basics of Plumbing	16		
Unit 6	Preparation for plumbing installation and maintenance	16		
Unit 7	Installation of plumbing fixtures	32		
	Total (B)	72	108	40
Part C	Practical Work			
	Practical Examination			20
	Written Test			10
	Viva Voce			10
	Practical Record			10
	Total (C)			50
	Grand Total (A+B+C)	60	100	100

CLASS XI – PAPER II (FULL MARKS: 100)

	Units	No. of Theory classes (In Hours)	No. of Practical Classes (In Hours)	Max Marks
Part A	Employability Skills			
Unit 1	Information and Communication Technology Skills – I	05	10	10
Unit 2	Green Skills and Sustainability – I	05	05	
	Total (A)	10	15	10
Part B	Vocational Skills			
Unit 4	Health and Safety	18	108	
Unit 5	Plumbing Hand Tools	54		
	Total (B)	72	108	40
Part C	Practical Work			
	Practical Examination			20
	Written Test			10
	Viva Voce			10
	Practical Record			10
	Total (C)			50
	Grand Total (A+B+C)	60	100	100

Question Setting Pattern for Theory Subject for Class XI and XII

Marks: 50 Time Duration: 2 hrs 30 minutes

		Each Question Value	No. of questions to answer	Maximum Marks
Part I	10 MCQs (All Questions to be answered)	1	10	10
Part II	Short answer type- approx 50 words. (4 out of 6 questions)	5	4	20
Part III	Long type Answer – 200 to 300 words. (2 out of 4 questions)	10	2	20
			TOTAL MARKS	50

CLASS XII – Paper 1 || Full Marks: 100

	Units	No. of Theory classes	No. of Practical Classes	Max Marks
Part A	Employability Skills			
	Communication Skills – I	04	05	10
	Self-management Skills – I	03	05	
	Entrepreneurial Skills – I	03	05	
	Total (A)	10	15	10
Part B	Vocational Skills			
	Installation of the Pump	14	108	40
	Installation of water supply system	34		
	Installation of the drainage system	24		
	Theory (B)	72	108	40
Part C	Practical Work			
	Practical Examination	03	10	15
	Written Test	01	03	10
	Viva Voce	01	02	5
	Total (C)	05	15	30
Part D	Project Work/Field Visit			
	Practical File/Student Portfolio	04	09	15
	Viva Voce	01	01	05
	Total (D)	05	10	20
	Grand Total (A+B+C+D) -	30	60	100

CLASS XI – Paper 2 || Full Marks: 100

	Units	No. of Theory classes	No. of Practical Classes	Max Marks
Part A	Employability Skills			
	Information and Communication Technology Skills - I	05	10	10
	Green Skills and Sustainability - I	05	05	
	Total (A)	10	15	10
Part B	Vocational Skills			
	Troubleshooting and maintenance for plumbing	21	108	40
	Installation of Overhead Tank	12		
	Working effectively with others	23		
	Optimum Utilization of Resources	16		
	Theory (B)	72	108	40
Part C	Practical Work			
	Practical Examination	03	10	15
	Written Test	01	03	10
	Viva Voce	01	02	05
	Total (C)	05	15	30
Part D	Project Work/Field Visit			
	Practical File/Student Portfolio	04	09	15
	Viva Voce	01	01	05
	Total (D)	05	10	20
	Grand Total (A+B+C+D) -	30	60	100

Question Setting Pattern for Theory Subject for Class 11 and 12

Marks: 50 Time Duration: 2 hrs 30 minutes

		Each Question Value	No. of questions to answer	Maximum Marks
Part I	10 MCQs (All Questions to be answered)	1	10	10
Part II	Short answer type - 40 to 50 words each. (Students will answer 4 out of 6 questions)	5	4	20
Part III	Long type Answer – 200 to 300 words (2 out of 4 questions)	10	2	20
			TOTAL MARKS	50

XI- Paper-I (Vocational)

Introduction to the sector and the job role			
Learning Outcome	**Theory (08 Period)**	**Practical (13Period)**	**Period (21)**
Understand the importance of the plumbing industry	1. The plumbing industry and its importance. 2. Role of water management and plumbing skill council	List the plumbing industry. Identify and list the names of different logos of plumbing industry products	04
Employment potential in the plumbing industry	1. Job opportunities and demand in the field of plumbing industry	List out the different types of jobs in the plumbing sector	04
Understand the responsibilities of a general plumber	Duties and responsibilities of a general plumber	List the responsibilities of a general plumber	03
Explain the process of water flow in domestic and commercial setups	Water flow system in a domestic building, Water flow system in commercial setups	List the components of the water flow system in a domestic building List the components used in a water flow system for commercial setups	04
Describe the application of various types of plumbing systems in residential and	1.Application of various types of plumbing systems in	1. Identify and make a list of various types of plumbing systems in	06

commercial setups	residential areas 2. Application of various types of plumbing systems in commercial setups.	residential. 2. Identify and make a list of various types of plumbing systems in commercial setups.	
Basics of Plumbing			
Learning Outcome	**Theory (16 Period)**	**Practical (26 Period)**	**Period 42**
Symbols and terminology used in plumbing installation	Symbols and terminology used in plumbing installation	Draw the symbols used in plumbing products and plumbing systems installation	04
Standards applicable to piping installation	Indian standards like ISI/BIS are applicable to piping installation	Make a list of Indian standards like ISI/BIS applicable to piping installation	04
Importance of accuracy in measurement and calculation of plumbing work	Techniques of accuracy in measurement and calculation of plumbing work	1. Measures the plumbing work 2. Calculate the cost of the material used in plumbing work 3. Calculate the total cost of labour and material	10
Pipes, pipe fittings and supporting material used in plumbing and their characteristic and uses	State the names, grades, characteristics and applications of different pipes, pipe fittings, fixture supports, fastening hardware and materials such as sealants, adhesives, plumber's putty, marking material and cement used in plumbing 2. Supporting material like used in plumbing and their characteristic and uses	Identify the names, grades of different pipes, pipe fittings, fixture supports. 2. Identify the fastening hardware and materials such as sealants, adhesives, plumber's putty, marking material and cement used in plumbing	08
Plumbing tools and equipment's, lifting /load shifting equipment's	Plumbing tools 2. Lifting/load shifting equipment's including ladders, height scaffolding, elevated work platforms, hand trolleys, hoist and jacks used at plumbing installation sites.	Identify and list of plumbing tools. 2. Identify and list of Lifting/load shifting equipment's including ladders, height scaffolding, elevated work platforms, hand trolleys, hoist and jacks used at plumbing installation sites.	08

Explain the importance of water properties	Importance of water properties, pressure and flow rate. Capillary action and thermal expansion in plumbing	List the water properties for plumbing system 2. Measure the pH of water. 3. Read the water pressure with the help of water pressure gauge	08
Preparation for Plumbing Installation and Maintenance			
Learning Outcome	**Theory (16 Period)**	**Practical (26 Period)**	**Period 42**
Discuss the importance Plumbing drawings	Role of plumbing drawings 2. Layout 3. Measurements from drawing and plans associated with the plumbing	Extract the information from job specifications, layouts and measurements from drawings and plans associated with plumbing 2. Calculate the quantity, dimensions and type of pipes, pipe fittings, devices and materials required from design drawings/specifications.	14
Explain the planning of the work schedule and work-related information	Importance of planning of work schedule and work-related information	Prepare a work plan as per the specified timelines.	04
Describe the importance of safe handling and storage of plumbing materials	Importance of safe handling and storage of plumbing material	Perform an inspection of the tools and equipment to check for their proper functioning. 2. Demonstrate the process of clearing the work area of hazardous substances, debris and waste. 3. Demonstrate correct storage practices for plumbing material. 4. Demonstrate placement of signages and barricades.	14
List measures to avoid air and water contamination, erosion and sedimentation	Air and water contamination, erosion and sedimentation	Identify the Air and water contamination, erosion and sedimentation	03
Discuss the role and impact of not following define procedure	Disadvantages and impact of not following define procedures.	List the disadvantages and impact of not following define procedures	03
Outline the process of the reporting and handling hazards at the work place	Outline the process of the reporting and handling hazards at the work place	Write an application of reporting of handling hazards at the work place.	04
Installation of plumbing fixtures			
Learning Outcome	**Theory (32 Period)**	**Practical (43 Period)**	**Period**

			75
Describe the types, characteristics ,materials, finishes, uses, limitations, working principle and performance measures of various plumbing related fixtures.	.Types, characteristics, materials, finishes, uses, limitations, working principle and performance measures of various plumbing related fixtures.	Show how to tally the count and quality of fixtures, parts, support material provided in the packing with the manufacturer's list or order form. 2. Select the size, type and quantity of fixture and trim required for specific applications based on specifications. 3. Demonstrate how to mark the position of fixtures and fixture supports in structures based on plumbing plans. 4. Demonstrate the procedure of installing various types of sanitary fixtures, supports, and accessories.	14
List the accessories, supports and fasteners required for installing various types of washbasin, sinks, water closet, urinals, bathtubs and showers.	List the accessories, supports and fasteners required for installing various types of washbasin, sinks, water closet, urinals, bathtubs and showers.	Show how to tally the count and quality of fixtures, parts, support material provided in the packing with the manufacturer's list or order form. 2. Select the size, type and quantity of fixture and trim required for specific applications based on specifications. 3. Demonstrate how to mark the position of fixtures and fixture supports in structures based on plumbing plans. 4. Demonstrate the procedure of installing various types of sanitary fixtures, supports, and accessories.	14
List the sensor types of fittings and fixtures.	Sensor types of fittings and fixtures.	Demonstrate the installation of sensors and batteries of fixtures with sensor-based or touchless fitting and fixtures.	06
Introduction to Types of Valves	Study of different valve types (ball, gate, globe, butterfly).	-	03
Valve Function and Selection Criteria	Understanding valve functions and selection based on flow/pressure requirements.	-	06
Valve Installation Procedures	Learn installation methods for various valves.	Installing valves and checking seals.	12
Valve Testing and Troubleshooting	Study pressure testing, troubleshooting valve issues.	Conducting valve performance tests and troubleshooting.	12
Explain the basic working principal of	Basic working principal of sensor	Demonstrate the installation of sensors and batteries of fixtures with sensor-based or	04

sensor faucet and the principles of solenoid ball valves and sensors in touch less system.	faucet and the principles of solenoid ball valves and sensors in touch less system.	touchless fitting and fixtures.	
Describe the correct practices for installing plumbing fixtures.	Correct practices for installing plumbing fixtures.	Apply appropriate techniques to check if all installations are properly sized, supported and functioning	04

XI- Paper-II (Vocational)

Health and Safety			
Learning Outcome	**Theory (18 Period)**	**Practical (27 Period)**	**Period 45**
Differentiate between risks and hazards. (KU4)	Differentiate between risks and hazards. (KU4)	Perform inspection of a work area in order to identify risks and hazards. (PC1)	03
Discuss the specific safety and health related problems faced in domestic, commercial and institutional setups.	Specific safety and health related problems faced in domestic, commercial and institutional setups.	Apply various health and safety precautions to be taken during plumbing work.	03
List the various types of hazards (such as physical, fire, chemical compounds and electrical) that could affect the work process.	Various types of hazards (such as physical, fire, chemical compounds and electrical) that could affect the work process.	Apply personal and workspace hygiene and sanitation practices.	03
List the various hazardous environments and common hazards that can occur during plumbing installation and maintenance along with their precautions and remedial measures.	Various hazardous environments and common hazards that can occur during plumbing installation and maintenance along with their precautions and remedial measures.	List the various hazardous environments and common hazards that can occur during plumbing installation.	03
Discuss the importance of various types of personal protective	Importance of various types of personal protective equipment (PPE).	Make a image of various types of personal protective equipment (PPE).	03

equipment (PPE).			
Discuss where the general health and safety equipment commonly is kept at the workplace.	General health and safety equipment commonly is kept at the workplace.	Locate and identify the placewhere the general health and safety equipment commonly is kept at the workplace.	03
Explain the various types of safety signs and their significance in the work process.	Various types of safety signs and their significance in the work process.	1. Draw the image of various types of safety signs and their significance in the work process.	03
Discuss various causes of fire and precautionary activities to prevent the fire accident.	Various causes of fire and precautionary activities to prevent the fire accident.	1.Demonstrate the correct use of fire extinguishers	04
List the different techniques that employ various methods (such as using extinguishers, water hose, sprinklers, sand bucket, wet blanket, etc.) and materials such as water, powder, foam, CO2, fire extinguishing chemical, sand, blanket, etc. used for extinguishing fire as per the type (as per class A, B, C and D).	List the different techniques that employ various methods (such as using extinguishers, water hose, sprinklers, sand bucket, wet blanket, etc.) and materials such as water, powder, foam, CO2, fire extinguishing chemical, sand, blanket, etc. used for extinguishing fire as per the type (as per class A, B, C and D).	Make a list of different items used for fire protection.	03
Describe rescue techniques applied during a fire hazard or electrocution.	Rescue techniques applied during a fire hazard or electrocution.	Dramatize workplace emergency and evacuation procedures using role plays.	04
First AID Basic	Basic first aid	First Aid Method and basic training.	04
Discuss appropriate basic first aid treatment relevant to the condition e.g. shock, electrical shock, bleeding, minor burns, poisoning, eye injuries etc.	Basic first aid treatment relevant to the condition e.g. shock, electrical shock, bleeding, minor burns, poisoning, eye injuries etc.	Perform appropriate first aid treatment for various conditions such as bleeding, burns, choking, electric shock and poisoning and injury 2. Dramatise, using role play, safe methods of freeing a person from electrocution.	06
Discuss potential	Potential injuries and	Demonstrate the process of providing cardio	03

injuries and health problems associated with incorrect handing of tools and equipment.	health problems associated with incorrect handing of tools and equipment.	pulmonary resuscitation (CPR).	
Plumbing Hand Tools			
Learning Outcome	**Theory (54 period)**	**Practical (81 period)**	**Period 135**
	Description of simple fitting operations hack sawing, punching and filing	Demonstrate use of various Hand Tools:- Different Files, Hammer. Centre Punch, Hacksaw, Chisel. Callipers, Pipe Wrench, Stock & Dies, Taps and Holders.	32
	Types of files commonly used.	Filing practice, surface filing, marking of straight and parallel lines with odd leg caliper and steel rule	20
	Marking instruments and their use of a simple drilling machine.	Thread Inner on M.S. flat by using Tap. (5hrs	12
	Method of using drills.		3
	Description of simple bench drilling Machine.		4
	Description of Grinding and Chisel		3
	Plumber's common hand tools - names, description and material from which they are made.	Use Steel rule and Steel Tape for measuring, Use Scriber and Divider for marking on raw materials	20
	Description, types and uses of holding device	Demonstrate use of different types of Vices:- Bench vice, Pipe vice Chain Vice, Hand vice, Chain Wrench. (20	34
	* Hammers & cold chisels, cutting tools.		7

XII- Paper-I (Vocational)

Installation of the Pump			
Learning Outcome	**Theory (14 Period)**	**Practical (23 Period)**	**Period 37**
Introduction to Pumps	Learn about	-	04

and Their Types	centrifugal and reciprocating pumps, their use cases.		
Electrical Wiring for Pump Installation	Study electrical wiring for pumps.	Wiring a pump and connecting it to the power source.	11
Pump Installation Guidelines	Understanding pump installation processes.	Hands-on installation of a pump.	11
Troubleshooting Pump Issues and Flow Regulation	Learn common pump problems and their solutions.	Troubleshooting and adjusting pump flow.	11
Installation of water supply system			
Learning Outcome	**Theory (34 Period)**	**Practical (51 Period)**	**Period 85**
Explain the working and use of conservancy, water carriage and the combination system.	Working and use of conservancy, water carriage, and the combination system.	Draw the image on working and use of conservancy, water carriage and the combination system.	06
Discuss alignment and elevation techniques used in plumbing systems.	Alignment and elevation techniques used in plumbing systems.	Perform alignment and levelling of supports and fixtures installed.	03
List the codes, standards and regulations applicable for the installation of plumbing fixtures.	Codes, standards and regulations applicable for the installation of plumbing fixtures.	List the codes, standards and regulations applicable for the installation of plumbing fixtures.	03
Explain the process of water distribution in municipal, residential, and private setups.	Process of water distribution in municipal, residential, and private setups.	List the process and various components of a water supply and distribution system. 2. Determine the fitting requirements for specified water supply pipe installations.	04
Describe the piping system layouts for various types of water supply systems.	State the piping system layouts for various types of water supply systems.	List the piping system layouts for various types of water supply systems.	03
Describe the various techniques of installing the water piping system in a building.	Various techniques of installing the water piping system in a building such as over ground piping, underground piping, piping embedded in concrete, concealed	List the various techniques of installing the water piping system in a building. 2. Apply appropriate cutting and bending techniques on water supply plumbing pipes. 3. Demonstrate how to join and fix pipes as per defined specifications. 4. Demonstrate the steps involved in the	14

	piping, wall mounted piping.	installation of water supply piping, fittings and components in buildings.	
Explain the properties of the different types of supports, hangers and restraints used in water supply plumbing systems.	Properties of the different types of supports, hangers and restraints used in water supply plumbing systems.	Write the properties of the different types of supports, hangers and restraints used in water supply plumbing systems.	04
Describe the characteristics of metal used in various plumbing materials and the fabrication methods compatible with them.	Characteristics of metal used in various plumbing materials and the fabrication methods compatible with them.	Identify and list the characteristics of metal used in various plumbing materials and the fabrication methods compatible with them.	03
Explain the process of electrolysis and problems associated with the use of dissimilar metals	Process of electrolysis and problems associated with the use of dissimilar metals.	Identify the process of electrolysis 2. List the problems associated with the use of dissimilar metals.	04
State the impact of accurate marking on the fabrication process work time and finished work quality.	Impact of accurate marking on the fabrication process work time and finished work quality.	List the advantage of using accurate marking on the fabrication process. 2. Demonstrate the steps involved in marking dimensions for fabrication on the pipes and fittings making allowances for spring-back, distortion and assembly.	06
Describe the measuring and marking out processes and allowances for fabrication of pipes	Measuring and marking out processes for the fabrication of pipes. 2. Allowance to be considered in measurement	Measure and mark the fabricated pipe. 2. Measure the allowance.	04
List standard measuring procedures such as center-to center, end-to center, and end to-end	1. Standard measuring procedures such as center-to-center, end-to center, and end-to-end.	Measure the dimension such as center-to-center, end-to-center, and end-to-end of a pipe.	04
Describe the types, characteristics and the application of different pipe fittings and fixture supports.	Type, characteristics and application of different pipe fittings and fixture supports.	List the types, characteristics. 2. List the different pipe fittings and fixture supports.	03
Discuss the various fixing and jointing techniques for water	Various fixing and jointing techniques for water supply	Identify the various fixing and jointing for water supply piping installations.	03

supply piping installations.	piping installations.		
Explain the principles underlying various fit-off processes.	Principles underlying various fit- off processes.	Do the practices of underlying various fit-off processes. 2. Perform the inspection of the water supply installation system to ensure proper alignment, size, support and functioning.	06
State the importance of ensuring alignment and balance in piping installations	Importance of ensuring alignment and balance in piping installations.	Do the practices of alignment and balance in piping installations.	03
Describe the test procedures to check proper functioning of the pipework installed.	Test procedures to check proper functioning of the pipework installed.	Do the testing to check proper functioning of the pipework installed	03
Describe the checks and procedures to be conducted before commissioning	Checks and procedures to be conducted before commissioning.	Make a list of checks and procedures to be conducted before commissioning. 2. Evaluate faults and their causes in dysfunctional piping. 3. Demonstrate the rectification of common faults found in dysfunctional piping.	06
Explain the importance of reporting any difficulties as soon as they arise.	Importance of reporting any difficulties as soon as they arise.	Perform post-installation activities such as clearing the work area, disposal of waste and cleaning and storage of tools and equipment.	03
Installation of the Drainage System			
Learning Outcome	**Theory (23 Period)**	**Practical (35 Period)**	**Period 58**
Explain the importance of traps for the sanitary fittings, both deep seal traps and low seal traps.	Importance of traps for the sanitary fittings, both deep seal traps and low seal traps.	Demonstrate the traps for the sanitary fittings, both deep seal traps and low seal traps.	04
Discuss the process of wastewater drainage	Process of wastewater drainage	Apply appropriate techniques to determine the location of various drainage components and the route of the water drainage piping and traps using plumbing project plans.	03
Describe the functions of the components of drainage systems	Describe the functions of the components of drainage systems.	Apply appropriate techniques to determine the location of various drainage components and the route of the water drainage piping and traps using plumbing project plans	03
Describe the various types of drainage piping systems and the	Various types of drainage piping systems and the pipes	Identify the various types of drainage piping systems and the pipes and fittings used in them. 2. Determine fitting requirements for	04

pipes and fittings used in them.	and fittings used in them.	installing various types of drainage pipes according to given specifications and site requirements.	
Discuss the type of drainage piping systems and its components used in various types of building.	Discuss the type of drainage piping systems and its components used in various types of building.	. Demonstrate the construction of chambers to accommodate drainage systems.	03
Explain the characteristics and the application of different pipe fittings, fixture supports and fastening hardware	Characteristics and the application of different pipe fittings, fixture supports and fastening hardware.	Perform the necessary checks on the area for laying underground, above ground and overhead piping systems.	03
Discuss the fit off, fixing and jointing techniques applicable for drainage pipes.	Importance of the fit off, fixing and jointing techniques applicable for drainage pipes.	Perform fitting activities on various types of pipes such as stoneware (SW) pipes, polyvinyl chloride (PVC) pipes, cast iron (CI) pipes, etc.	06
Explain the procedure of installing various types of drainage systems such as sewage, sullage, stormwater, sub soil drainage system, drainage for fixtures, etc.	Method of installation various types of drainage systems such as sewage, sullage, stormwater, sub-soil drainage system, drainage for fixtures, etc.	Demonstrate the installation of the various components of drainage system such as various pipes and their fittings, manholes, traps, cleanouts, catch basins, inspection chambers, soak pits, etc.	04
Identify the trap to be installed as per the type of drainage system.	Different types of traps as per the type of drainage system.	Demonstrate the installation of the various components of drainage system such as various pipes and their fittings, manholes, traps, cleanouts, catch basins, inspection chambers, soak pits, etc.	02
List different types of pumps used in sanitary and drainage systems and their applications.	Pumps used in sanitary and drainage systems and their applications	Identify different types of pumps used in sanitary and drainage systems and their applications. 2. Perform the steps to install different types of pumps used in sanitary and drainage system.	06
Discuss the characteristics of the flooring using for installation and levelling of drainage system	Characteristics of the flooring using for installation and levelling of drainage system	Show how to install stormwater and sub-soil drainage system. 2. Demonstrate the process of installing pipes and related accessories in water and sewage treatment plants.	08
Explain the	Importance of	Perform the various post installation and	04

importance of conducting post-installation and pre commissioning tests and checks	conducting post-installation and pre commissioning tests and checks	pre-commissioning tests and checks. 2. Perform the backfilling of all excavated areas to secure the installation.	
Describe the various post installation and pre commissioning tests and checks.	Various post installation and pre-commissioning tests and checks.	Perform the various post installation and pre-commissioning tests and checks. 2. Perform the backfilling of all excavated areas to secure the installation.	04
List the signages to be put up at the site after the plumbing task has been completed.	Signages to be put up at the site after the plumbing task has been completed.	Make a list of signages.	04

XII- Paper-II (Vocational)

Troubleshooting and maintenance for plumbing			
Learning Outcome	**Theory (21 Period)**	**Practical (32 Period)**	**Period 53**
List the various types of faults (such as leakages, improper joints, broken sewer; dripping faucets and water lines, etc.) associated with plumbing systems (such as aerators, septic systems etc.).	. Various types of faults (such as leakages, improper joints, broken sewer; dripping faucets and water lines, etc.) associated with plumbing systems (such as aerators, septic systems etc.).	Show how to detect faults in various types of plumbing systems and fixtures.	06
List the testing procedures to be performed to check proper functioning of the fixtures and pipework installed.	Testing procedures to be performed to check proper functioning of the fixtures and pipework installed.	Demonstrate the procedures involved in repair and rectification of common faults within the pipes, plumbing fixtures, drainage and water supply systems.	11
State the remedial and preventive measures for common plumbing problems with respect to fixtures, pipes and fittings.	Remedial and preventive measures for common plumbing problems with respect to fixtures, pipes and fittings.	List the remedial and preventive measures for common plumbing problems with respect to fixtures, pipes and fittings.	04
Discuss correct practices for troubleshooting and	Correct practices for troubleshooting and maintenance for	List the remedial and preventive measures for common plumbing problems with respect	04

maintenance for plumbing fixtures and systems.	plumbing fixtures and systems.	to fixtures, pipes and fittings.	
Discuss correct practices for troubleshooting and maintenance for plumbing fixtures and systems.	Correct practices for troubleshooting and maintenance for plumbing fixtures and systems.	List the practices for troubleshooting and maintenance for plumbing fixtures and systems.	04
Explain the application of mechanical and hydraulic principles for clearing blockages.	Application of mechanical and hydraulic principles for clearing blockages.	Demonstrate cleaning and clearance related activities after completion of work.	06
List the methods of corrosion protection such as coatings and tape.	Methods of corrosion protection such as coatings and tape	Demonstrate the methods of corrosion protection such as coatings and tape.	08
Discuss common organisational policies related to costing, scheduling, procurement and documentation for plumbing maintenance and repair work.	Common organisational policies related to costing, scheduling, procurement and documentation for plumbing maintenance and repair work.	Display how to record daily logs in a specified format for activities such as maintenance and installation. 2. Role play a situation on how to guide the customers instruct the customers on proper care and maintenance of plumbing systems.	10
Installation of Overhead Tank			
Learning Outcome	**Theory (12 Period)**	**Practical (18 Period)**	**Period 30**
Introduction to Overhead Tank Types and Materials	Study of different tank types (plastic, steel, concrete) and their materials.	-	04
Guidelines for Installing Overhead Tanks	Learn about installation height, structural requirements.	Hands-on installation of an overhead tank.	13
Pipe Connections to Overhead Tank	Learn how to connect pipes to tanks, use of float valves.	Installing pipes and float mechanisms.	13
Working effectively with others			
Learning Outcome	**Theory (23 Period)**	**Practical (36 Period)**	**Period 59**

State the importance of effective communication in the workplace.	State the importance of effective communication in the workplace	Demonstrate techniques used for ensuring timely receipt of complete information and instructions from appropriate sources	03
Describe the typical organisational hierarchy and the various categories of people that one is required to communicate and coordinate with.	Typical organisational hierarchy and the various categories of people that one is required to communicate and coordinate with	Apply practices that improve effectiveness while providing information	03
List various components of effective communication.	List various components of effective communication	Demonstrate the use of inclusive language(verbal, non-verbal and written) that is gender, disability and culturally sensitive.	03
State the importance of using inclusive language (verbal, non-verbal and written) that is gender, disability and culturally sensitive.	1. State the importance of using inclusive language (verbal, non-verbal and written) that is gender, disability and culturally sensitive	Illustrate the use of appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism	03
State the importance of teamwork and developing effective working relationships for professional success	Importance of teamwork and developing effective working relationships for professional success	Dramatise a situation to show effective teamwork	04
Discuss the importance and ways of managing interpersonal conflict effectively	1. Importance and ways of managing interpersonal conflict effectively	Dramatize (through role play) disciplined behaviours at the workplace	04
Discuss how to express and address grievances appropriately and effectively.	1. Discuss how to express and address grievances appropriately and effectively	Dramatize (through role-play) the process of scalation of grievances and problems	04
State the importance of ethics and discipline for professional success.	State the importance of ethics and discipline for professional success.		03
Discuss the legislation, standards, policies, and procedures relevant to own	1. Discuss the legislation, standards, policies, and procedures relevant	1. List the legislation, standards, policies, and procedures relevant to own employment and performance conditions.	03

employment and performance conditions.	to own employment and performance conditions.		
. Discuss importance of dress code in organisations.	1. Discuss importance of dress code in organisations	1. Identify the dress code in organisations	03
Explain the impact of gender, disability, cultural and age-related biases, stereotyping at the workplace and in society	Impact of gender, disability, cultural and age-related biases, stereotyping at the workplace and in society	Recognize indicators of harassment and discrimination based on gender, disability, caste, religion, colour, sexual orientation and culture at workplace . Demonstrate practices to eliminate personal bias based on gender, disability,caste, religion, colour, sexual orientation and culture from routine transactions	04
List the different types of disabilities and the challenges Discuss gender, disability and cultural biases, stereotypes and faced by persons with disability (PwD).	1. List the different types of disabilities and the challenges faced by persons with disability (PwD)		04
State the laws, acts, provisions and schemes defined for PwD by the Government bodies	State the laws, acts, provisions and schemes defined for PwD by the Government bodies.		03
Discuss gender, disability and cultural biases, stereotypes and impact on others	Discuss gender, disability and cultural biases, stereotypes and impact on others		02
.Discuss basic gender concepts such as gender power relations, gender roles, access and control, gender sensitivity, gender equity and equality	Discuss basic gender concepts such as gender power relations, gender roles, access and control, gender sensitivity, gender equity and equality		02
Discuss the importance of gender sensitivity and equality.	Discuss the importance of gender sensitivity and equality		02
7.List the indicators of harassment and	List the indicators of harassment and		03

discrimination based on gender, disability, caste, religion or culture that occurs at a typical workplace.	discrimination based on gender, disability, caste, religion or culture that occurs at a typical workplace		
.State general organisational norms and procedures applied to protect against harassment and discrimination	State general organisational norms and procedures applied to protect against harassment and discrimination		03
Discuss the importance of reporting incidents of harassment and discrimination to appropriate authority.	Discuss the importance of reporting incidents of harassment and discrimination to appropriate authority		03
Optimum Utilization of Resources			
Learning Outcome	**Theory (16 Period)**	**Practical (22 Period)**	**Period 38**
Discuss the practices and impact of inefficient utilization of material and water	Discuss the practices and impact of inefficient utilization of material and water	Identify ways to optimize usage of water and other materials in various tasks/activities /processes.	03
Describe ways of efficiently managing material and water in the process.	Describe ways of efficiently managing material and water in the process	Perform inspection to check for spills/leakages at a workplace.	03
Explain the basics of electricity.	Explain the basics of electricity.		02
List common electrical and thermal equipment used in a plumbing workplace.	List common electrical and thermal equipment used in a plumbing workplace.		03
Describe the use of prevalent energy efficient devices.	Describe the use of prevalent energy efficient devices.	Apply various material conservation practices for plumbing work.	03
List indicators of common electrical problems	List indicators of common electrical problems.	Perform inspection of the work area for improperly connected electrical equipment	03
Discuss common practices of conserving electricity	Discuss common practices of conserving electricity		03
Explain the importance of checking if the	Explain the importance of	Apply appropriate techniques to use energy/electricity in an optimum way.	03

equipment/machine is functioning normally before commencing work and ensuring it is rectified.	checking if the equipment/machine is functioning normally before commencing work and ensuring it is rectified.		
Explain the usage of different colours of dustbins.	Explain the usage of different colours of dustbins.	6. Categorize waste into dry, wet, recyclable, nonrecyclable and items of single-use plastics.	03
Differentiate between recyclable and non-recyclable, and hazardous waste generated.	Differentiate between recyclable and non-recyclable, and hazardous waste generated.	Categorize waste into dry, wet, recyclable, nonrecyclable and items of singleuse plastics.	02
Discuss efficient waste management practices.	Discuss efficient waste management practices.	7. Employ effective waste management /recycling practices.	02
Discuss the common ways employed by organizations, to minimize waste generated from plumbing activities.	Discuss the common ways employed by organizations, to minimize waste generated from plumbing activities.		02
Discuss common sources of pollution and ways to minimize it	Discuss common sources of pollution and ways to minimize it		02
Explain the importance of reporting malfunctioning (fumes /sparks /emission /vibration /noise) and lapse in the maintenance of equipment on time.	Explain the importance of reporting malfunctioning (fumes /sparks /emission /vibration /noise) and lapse in the maintenance of equipment on time.		02

ORGANISATION OF FIELD VISITS

In a year, at least 3 field visits/educational tours should be organised for the students to expose them to the activities in the workplace. Visit a Plumbing site and observe the following: Location, Site, Plumbing site, Office building, newly constructed site, building store, Plumbing site. During the visit, students should obtain the following information from the owner or the supervisor of the Plumbing site:

1. Plumbing site activity being taken
2. Residential/Commercial project
3. Technology adopted
4. Type of material used
5. Sale procedure
6. Manpower engaged
7. Total expenditure of project
8. Total annual income
9. Profit/Loss (Annual)
10. Any other information

LIST OF EQUIPMENT AND MATERIALS

The tools, equipment and materials required for training are as follos:

1. Pipe wrench,
2. Parrot pliers,
3. Slide wrench,
4. Die set complete,
5. Hacksaw
6. Pipe vice,
7. Screw drivers set, D
8. Double Ended spanner set,
9. Allen Key set,
10. Drill bit set,
11. Drilling Machine,
12. Caulking tools
13. Hammers,
14. Measuring tape, plumb,
15. L-Square,
16. Spirit Level,
17. Hydraulic Testing Machine,
18. Smoke Generator for testing of pipes and joints,
19. Pressure gauge,
20. Powered pipe threading machine,
21. Taps/faucets,
22. Shower head complete,
23. Sink,
24. Flushing tanks,
25. Urinal,
26. Urinal flush,
27. Bidet,
28. Bath tub,
29. Geyser,

30. Clamps and Hangers,
31. Pipes,
32. Fittings and accessories as required.
33. Special tools
34. Special fixtures and fittings

VOCATIONAL TEACHER'S/TRAINER'S QUALIFICATION AND GUIDELINES

Qualification and other requirements for appointment of vocational teachers/trainers on contractual basis should be decided by the State/UT. The suggestive qualifications and minimum competencies for the vocational teacher should be as follows:

Qualification	Minimum Competencies	Age Limit
B.Tech in Civil Engineering, Agricultural Engineering, ,Mechanical Engineering and B.Voc. (Bachelor in Vocation) from a recognized Institute /University, with at least 1-year work/teaching experience Or Diploma in Civil engineering / Agricultural Engineering/ Mechanical Engineering with 2 years work/teaching experience	Effective communication skills (oral and written) • Basic computing skill	• Minimum 18 Years • Age relaxation to be provided as per Govt.rules.

Book Reference

PSS Central Institute of Vocational Education, NCERT
NIMI Theory and Practical Book Plumber
Plumber Trade Theory – NCVT/DGT
Plumber Trade Practical – NCVT/DGT
Plumbing Services – S.M. Patil
Basic Plumbing Services – N.K. Mehra
Manual on Water Supply and Treatment – CPHEEO
IS Codes – IS 1172, IS 2065, IS 1742, IS 1239, IS 4985, IS 17025
Basic Electrical Engineering – S.K. Bhattacharya