LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

Job Role: Plumber - General

(QUALIFICATION PACK: Ref. Id. PSC/Q0104)

SECTOR: Plumbing

Classes 11 and 12

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION

Shyamla Hills, Bhopal- 462 013, M.P., India

http://www.psscive.ac.in

Gandhiji's Talisman

I will give you a talisman. Whenever you are in doubt or when the self becomes too much with you, apply the following test:

Recall the face of the poorest and the weakest man whom you may have seen and ask yourself if the step you contemplate is going to be of any use to him. Will he gain anything by it? Will it restore him to a control over his own life and destiny? In other words, will it lead to Swaraj for the hungry and spiritually starving millions?

Then you will find your doubts and your self melting away.

LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

Job Role: Plumber - General

(QUALIFICATION PACK: Ref. Id. PSC/Q0104)

SECTOR: Plumber

Classes 11 and 12

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION
Shyamla Hills, Bhopal- 462 013, M.P., India
http://www.psscive.ac.in

LEARNING OUTCOME BASED CURRICULUM
Sector-WMPSC
Plumber – General, July 2022

http://www.psscive.ac.in

Published by:
Joint Director
PSS Central Institute of Vocational Education, NCERT, Shyamla Hills, Bhopal

PATRON
Prof. D.P. Saklani,
Director, National Council of EducationalResearch and Training (NCERT),
New Delhi

Dr. Deepka Paliwal
Joint Director
PSS Central Institute of Vocational Education, Bhopal

COURSE COORDINATOR

Prof. Saurabh Prakash, Ph.D.,
Head
Engineering and Technology Department,
PSSCIVE, Bhopal

FOREWORD

The Pandit Sunderlal Sharma Central Institute of Vocational Education (PSSCIVE) a constituent of the National Council of Educational Research and Training (NCERT) is spearheading the efforts of developing learning outcome-based curricula and courseware aimed at integrating both vocational and general qualifications to open pathways of careerprogression for students. It is a part of Centrally Sponsored Scheme of Vocationalisation of Secondary and Higher Secondary Education (CSSVSHSE) launched by the Ministry of Human Resource Development, Government of India in 2012. The PSS Central Institute of Vocational Education (PSSCIVE) is developing curricula under the project approved by the Project Approval Board (PAB) of *Rashtriya Madhyamik Shiksha Abhiyan* (RMSA). The main purpose ofthe learning outcome-based curricula is to bring about the improvement in teaching- learning process and working competences through learning outcomes embedded in the vocational subject.

It is a matter of great pleasure to introduce this learning outcome-based curriculum as part ofthe vocational training packages for the job role of **Plumber – General.** The curriculum has been developed for the secondary students of vocational education and is aligned to the National Occupation Standards (NOSs) of a job role identified and approved under the National Skill Qualification Framework (NSQF).

The curriculum aims to provide children with employability and vocational skills to support occupational mobility and lifelong learning. It will help them to acquire specific occupational skills that meet employers' immediate needs. The teaching process is to be performed through the interactive sessions in classrooms, practical activities in laboratories and workshops, projects, field visits, and professional experiences.

The curriculum has been developed and reviewed by a group of experts and their contributions are greatly acknowledged. The utility of the curriculum will be adjudged by the qualitative improvement that it brings about in teaching-learning. The feedback and suggestions on the content by the teachers and other stakeholders will be of immense value to us in bringing about further improvement in this document.

PROF. D.P. SAKLANI
Director
National Council of Education Research and Training

PREFACE

India today stands poised at a very exciting juncture in its saga. The potential for achieving inclusive growth are immense and the possibilities are equally exciting. The world is looking atus to deliver sustainable growth and progress. To meet the growing expectations, India will largely depend upon its young workforce. The much-discussed demographic dividend will bring sustaining benefits only if this young workforce is skilled and its potential is channelized in the right direction.

In order to fulfil the growing aspirations of our youth and the demand of skilled human resource, the Ministry of Human Resource Development (MHRD), Government of India introduced the revised Centrally Sponsored Scheme of Vocationalisation of Secondary and Higher Secondary Education that aims to provide for the diversification of educational opportunities so as to enhance individual employability, reduce the mismatch between demand and supply of skilled manpower and provide an alternative for those pursuing higher education. For spearheading the scheme, the PSS Central Institute of Vocational Education (PSSCIVE) was entrusted the responsibility to develop learning outcome based curricula, student workbooks, teacher handbooks and e-learning materials for the job roles in various sectors, with growth potential for employment.

The PSSCIVE firmly believes that the vocationalisation of education in the nation need to be established on a strong footing of philosophical, cultural and sociological traditions and it should aptly address the needs and aspirations of the students besides meeting the skill demands of the industry. The curriculum, therefore, aims at developing the desired professional, managerial and communication skills to fulfil the needs of the society and the world of work. In order to honour its commitment to the nation, the PSSSCIVE has initiated the work on developing learning outcome based curricula with the involvement of faculty members and leading experts in respective fields. It is being done through the concerted efforts of leading academicians, professionals, policy makers, partner institutions, Vocational Education and Training experts, industry representatives, and teachers. The expert group through a series of consultations, working group meetings and use of reference materials develops a National Curriculum. Currently, the Institute is working on developing curriculaand courseware for over 100 job roles in various sectors.

We extend our gratitude to all the contributors for selflessly sharing their precious knowledge, acclaimed expertise, and valuable time and positively responding to our request for development of curriculum. We are grateful to MHRD and NCERT for the financial support and cooperation in realising the objective of providing learning outcome-based curricula and courseware to the States and other stakeholders under the PAB (Project Approval Board) approved project of *Rashtriya Madhyamik Shiskha Abhiyan* (RMSA) of MHRD.

Finally, for transforming the proposed curriculum design into a vibrant reality of implementation, all the institutions involved in the delivery system shall have to come together with a firm commitment and they should secure optimal community support. The success of this curriculum depends upon its effective implementation and it is expected that the managers of vocational education and training system, including subject teachers willmake efforts to create better facilities, develop linkages with the world of work and foster aconducive environment as per the content of the curriculum document.

The PSSCIVE, Bhopal remains committed in bringing about reforms in the vocational education and training system through the learner-centric curricula and courseware. We hope that this document will prove useful in turning out more competent Indian workforce for the 21st Century.

DR. DEEPAK PALIWAL
Joint Director
PSS Central Institute of Vocational Education

ACKNOWLEDGEMENTS

On behalf of the team at the PSS Central Institute of Vocational Education (PSSCIVE) we are grateful to the members of the Project Approval Board (PAB) *of Rashtriya Madhyamik Shiksha Abhiyan* (RMSA) and the officials of the Ministry of Human Resource Development (MHRD), Government of India for the financial support to the project for development of curricula.

We are grateful to the Director, NCERT for his support and guidance. We also acknowledgethe contributions of our colleagues at the Technical Support Group of RMSA, MHRD, RMSACell at the National Council of Educational Research and Training (NCERT), National Skill Development Agency (NSDA) and National Skill Development Corporation (NSDC) and Water Management and Plumbing Skill Council for their academic support and cooperation in the development of curricula. We are grateful to the expert contributors and reviewers for their earnest effort and contributions in the development of this learning outcome-based curriculum. Their names are acknowledged in the list of contributors and reviewers.

The contributions made by Vinay Swarup Mehrotra, Professor and Head, Curriculum Development and Evaluation Centre (CDEC) and Vipin Kumar Jain, Associate Professor and Head, Programme Planning and Monitoring Cell (PPMC), Dr. Deepak Shuddalwar, Associate Professor PSSCIVE in development of the curriculum for the employability skills are duly acknowledged.

We are also grateful to the Course Coordinator **Prof. Saurabh Prakash,** Professor & Head, Department of Engineering & Technology for developing this curriculum. The contribution of Dr. Satyendra Thakur, Assistant Professor (Agricultural Engineering) is acknowledged. The assistance provided by Shri Vinod K. Soni, Computer Operator Grade-II, and Mr. Rajesh Kahar, DTP Operator in layout, design and composing of the material is duly acknowledged.

PSSCIVE Team

CONTENTS

S.No.	Title			Page No.
	Foreword			(i)
	Preface			(iii)
	Acknowledgement			(v)
1.	Course Overview			1
2.	Scheme of Units			2
3.	Teaching/Training Activities			4
4.	Assessment and Certification			4
5.	Unit Content	CLASS 11		
		Part A	**Employability Skills**	7
			Unit 1: Communication Skills-III	7
			Unit 2: Self-management Skills-III	8
			Unit 3: Information and Communication Technology Skills-III	9
			Unit 4: Entrepreneurial Skills-III	9
			Unit 5: Green Skills-III	10
		Part B	**Vocational Skills**	11
			Unit 1: Introduction to the sector and the job role	11
			Unit 2: Basics of plumbing	12
			Unit 3: Preparation for plumbing installation and maintenance	13
			Unit 4: Installation of water supply system	14
			Unit 5: Installation of drainage system	17
		CLASS 12		
		Part A	**Employability Skills**	19
			Unit 1: Communication Skills-IV	19
			Unit 2: Self-management Skills-IV	20
			Unit 3: Information and Communication Technology Skills-IV	20
			Unit 4: Entrepreneurial Skills-IV	22
			Unit 5: Green Skills-IV	22
		Part B	**Vocational Skills**	23
			Unit 1: Installation of plumbing fixtures	23
			Unit 2: Troubleshooting and maintenance for plumbing	25
			Unit 3: Health and safety	27
			Unit 4: Working effectively with others	29
			Unit 5: Optimum utilization of resources	31
6.	Organisation of Field Visits			33
7.	List of Equipment and Materials			33
8.	Vocational Teacher's/ Trainer's Qualification and Guidelines			34
9.	List of Contributors			37

1. COURSE OVERVIEW

COURSE TITLE: Plumber – General

Plumber – General is an important job role in installation and repair of 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 theassignment. The person should be comfortable in performing laborious work, should be agood 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:

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

COURSE REQUIREMENTS: The learner should have the basic knowledge of science.

COURSE LEVEL: This is a course for class XI and XII. On completion of this course, a student can take up a higher level course in the area of Plumber sector.

COURSE DURATION: **600 hrs**

Class 11	:	300 hrs
Class 12	:	300 hrs
Total	**:**	**600 hrs**

2. SCHEME OF UNITS

This course is a planned sequence of instructions consisting of Units meant for developing employability and vocational competencies of students of Class 11 and 12 opting for vocational subject along with general education subjects. The unit-wise distribution of hours and marks for Class 11 is as follows:

CLASS 11			
	Units	**No. of Hours for Theory and Practical 300**	**Max. Marks for Theory and Practical 100**
Part A	**Employability Skills**		
	Unit 1 : Communication Skills-III	25	10
	Unit 2 : Self-management Skills-III	25	
	Unit 3 : Information and Communication Technology Skills-III	20	
	Unit 4 : Entrepreneurial Skills-III	25	
	Unit 5 : Green Skills-III	15	
	Total	**110**	**10**
Part B	**Vocational Skills**		
	Unit 1: Introduction to the sector and the job role	20	40
	Unit 2: Basics of plumbing	30	
	Unit 3: Preparation for plumbing installation and maintenance	25	
	Unit 4: Installation of water supply system	45	
	Unit 5: Installation of drainage system	45	
	Total	**165**	**40**
Part C	**Practical Work**		
	Practical Examination	06	15
	Written Test	01	10
	Viva Voce	03	10
	Total	**10**	**35**
Part D	**Project Work/Field Visit**		
	Practical File/Student Portfolio	10	10
	Viva Voce	05	05
	Total	**15**	**15**
	Total	**300**	**100**

The unit-wise distribution of hours and marks for Class 12 is as follows:

CLASS 12			
	Units	**No. of Hours for Theory and Practical 300**	**Max. Marks for Theory and Practical 100**
Part A	**Employability Skills**		
	Unit 1 : Communication Skills-IV	25	10
	Unit 2 : Self-management Skills-IV	25	
	Unit 3 : Information and Communication Technology Skills-IV	20	
	Unit 4 : Entrepreneurial Skills-IV	15	
	Unit 5 : Green Skills-IV	15	
	Total	**100**	**10**
Part B	**Vocational Skills**		
	Unit 1: Installation of plumbing fixtures	35	40
	Unit 2: Trouble shooting and maintenance for plumbing	30	
	Unit 3: Health and safety	30	
	Unit 4: Working effectively with others	40	
	Unit 5: Optimum utilization of resources	30	
	Total	**165**	**40**
Part C	**Practical Work**		
	Practical Examination	06	15
	Written Test	01	10
	Viva Voce	03	10
Total		**10**	**35**
Part D	**Project Work/Field Visit**		
	Practical File/Student Portfolio	10	10
	Viva Voce	05	05
	Total	**15**	**15**
	Total	**300**	**100**

3. TEACHING/TRAINING ACTIVITIES

The teaching and training activities have to be conducted in classroom, laboratory/ workshops and field visits. Students should be taken to field visits for interaction with expertsand to expose them to the various tools, equipment, materials, procedures and operations in the workplace. Special emphasis should be laid on the occupational safety, health and hygiene during the training and field visits.

CLASSROOM ACTIVITIES

Classroom activities are an integral part of this course and interactive lecture sessions, followed by discussions should be conducted by trained vocational teachers. Vocational teachers should make effective use of a variety of instructional or teaching aids, such as audio-video materials, colour slides, charts, diagrams, models, exhibits, hand-outs, online teaching materials, etc. to transmit knowledge and impart training to the students.

PRACTICAL WORK IN LABORATORY/WORKSHOP

Practical work may include but not limited to hands-on-training, simulated training, role play, case based studies, exercises, etc. Equipment and supplies should be provided to enhance hands-on learning experience of students. Only trained personnel should teach specialized techniques. A training plan that reflects tools, equipment, materials, skills and activities to be performed by the students should be submitted by the vocational teacher to the Head of the Institution.

FIELD VISITS/ EDUCATIONAL TOUR

In field visits, children will go outside the classroom to obtain specific information from expertsor to make observations of the activities. A checklist of observations to be made by the students during the field visits should be developed by the Vocational Teachers for systematiccollection of information by the students on the various aspects. Principals and Teachers should identify the different opportunities for field visits within a short distance from the schooland make necessary arrangements for the visits. At least three field visits should be conducted in a year.

4. ASSESSMENT AND CERTIFICATION

Upon successful completion of the course by the candidate, the central/ state examination board for secondary education and the respective sector skill council will certify the competencies.

The National Skills Qualifications Framework (NSQF) is based on outcomes referenced to the National Occupation Standards (NOSs), rather than inputs. The NSQF level descriptors, which are the learning outcomes for each level, include the process, professional knowledge, professional skills, core skills and responsibility. The assessment is to be undertaken to verify that individuals have the knowledge and skills needed to perform a particular job and thatthe learning programme undertaken has delivered education at a given standard. It shouldbe closely linked to certification so that the individual and the employer could come to know the competencies acquired through the vocational subject or course. The assessment should

be reliable, valid, flexible, convenient, cost effective and above all it should be fair and transparent. Standardized assessment tools should be used for assessment of knowledge of students. Necessary arrangements should be made for using technology in assessment of students.

KNOWLEDGE ASSESSMENT (THEORY)

Knowledge Assessment should include two components: one comprising of internal assessment and second an external examination, including theory examination to be conducted by the Board. The assessment tools shall contain components for testing the knowledge and application of knowledge. The knowledge test can be objective paper based test or short structured questions based on the content of the curriculum.

WRITTEN TEST

It allows candidates to demonstrate that they have the knowledge and understanding of a given topic. Theory question paper for the vocational subject should be prepared by the subject experts comprising group of experts of academicians, experts from existing vocational subject experts/teachers, and subject experts from university/colleges or industry. The respective Sector Skill Council should be consulted by the Central/State Board for preparing the panel of experts for question paper setting and conducting the examinations.

The blue print for the question paper may be as follows:

Duration: 3 hrs **Max. Mark: 30**

		No. of Questions			
S.No.	**Typology of Question**	**Very Short Answer (1 mark)**	**Short Answer (2 Marks)**	**Long Answer (3 Marks)**	**Marks**
1.	Remembering – (Knowledge based simple recall questions, to know specific facts, terms, concepts, principles, or theories; identify, define or recite, information)	**2**	**1**	**2**	**10**
2.	Understanding – (Comprehension – to be familiar with meaning andto understand conceptually, interpret, compare, contrast, explain, paraphrase, or interpret information)	**1**	**2**	**2**	**11**
3.	Application – (Use abstract information in concrete situation,to apply knowledge to new situations: Use given content to interpret a situation, private an example, or solve a problem)	**0**	**1**	**1**	**05**

4.	High Order Thinking Skills – (Analysis & Synthesis – Classify, compare, contrast, or differentiate between different pieces of information; Organize and/ or integrate unique piecesof information from a variety of sources)	**0**	**1**	**0**	**02**
5.	Evaluation – (Appraise, judge, and/or justify the value or worth ofa decision or outcome, or to predict outcomes based on values)	**0**	**1**	**0**	**02**
	Total	**3x1=3**	**6x2=12**	**5x3=15**	**30** **(14 questions)**

SKILL ASSESSMENT (PRACTICAL)

Assessment of skills by the students should be done by the assessors/examiners on the basis of practical demonstration of skills by the candidate, using a competency checklist. The competency checklist should be developed as per the National Occupation Standards (NOSs) given in the Qualification Pack for the Job Role to bring about necessary consistency in the quality of assessment across different sectors and Institutions. The student has to demonstrate competency against the performance criteria defined in the National Occupation Standards and the assessment will indicate that they are 'competent', or are 'not yet competent'. The assessors assessing the skills of the students should possess a current experience in the industry and should have undergone an effective training in assessmentprinciples and practices. The Sector Skill Councils should ensure that the assessors are provided with the training on the assessment of competencies.

Practical examination allows candidates to demonstrate that they have the knowledge and understanding of performing a task. This will include hands-on practical exam and viva voce. For practical, there should be a team of two evaluators – the subject teacher and the expert from the relevant industry certified by the Board or concerned Sector Skill Council. The same team of examiners will conduct the viva voce.

Project Work (individual or group project) is a great way to assess the practical skills on a certain time period or timeline. Project work should be given on the basis of the capability of the individual to perform the tasks or activities involved in the project. Projects should be discussed in the class and the teacher should periodically monitor the progress of the project and provide feedback for improvement and innovation. Field visits should be organised aspart of the project work. Field visits can be followed by a small-group work/project work. When the class returns from the field visit, each group might be asked to use the information that they have gathered to prepare presentations or reports of their observations.Project work should be assessed on the basis of practical file or student portfolio.

Student Portfolio is a compilation of documents that supports the candidate's claim of competence. Documents may include reports, articles, photos of products prepared by students in relation to the unit of competency.

Viva voce allows candidates to demonstrate communication skills and content knowledge. Audio or video recording can be done at the time of viva voce. The number of external examiners would be decided as per the existing norms of the Board and these norms should be suitably adopted/adapted as per the specific requirements of the vocational subject. Viva voce should also be conducted to obtain feedback on the student's experiences and learning during the project work/field visits.

CONTINUOUS AND COMPREHENSIVE EVALUATION

Continuous and Comprehensive Evaluation (CCE) refers to a system of school-based evaluation of students that covers all aspects of student's development. In this scheme, the term `continuous' is meant to emphasize that evaluation of identified aspects of students `growth and development' is a continuous process rather than an event, built into the total teaching-learning process and spread over the entire span of academic session. The second term `comprehensive' means that the scheme attempts to cover both the scholastic and the co-scholastic aspects of students' growth and development. For details, the CCE manual ofCentral Board of Secondary Education (CBSE) or the guidelines issued by the State Boards on the procedure for CCE should be followed by the Institutions.

5. UNIT CONTENTS

CLASS 11

Part A: Employability Skills

S.No.	Units	Duration (Hrs)
1.	Communication Skills - III	25
2.	Self-management Skills - IIII	25
3.	Information and Communication Technology Skills- III	20
4.	Entrepreneurial Skills - III	25
5.	Green Skills - III	15
	Total	**110**

Unit 1: Communication Skill - III

Learning Outcome	Theory(10 hrs)	Practical (15 hrs)	Duration (25 Hrs)
1. Demonstrate knowledge of various methods of communication	1. Methods of communication 2. Verbal 3. Non-verbal 4. Visual	1. Writing pros and cons of written, verbal and non-verbal communication 2. Listing do's and don'ts for avoiding common body language mistakes	**05**
2. Identify specific communication styles	1. Communication styles- assertive, aggressive, passive-aggressive,	1. Observing and sharing communication styles of friends, teachers and family members and adapting the best practices	**10**

	submissive, etc.	2. Role plays on communication styles.	
3. Demonstrate basic writing skills	1. Writing skills to the following: • Sentence • Phrase • Kinds of Sentences • Parts of Sentence • Parts of Speech • Articles 2. Construction ofa Paragraph	1. Demonstration and practice of writing sentences and paragraphs on topics related to the subject	**10**
Total			**25**

Unit 2: Self-management Skills – III

Learning Outcome	Theory (10 hrs)	Practica l(15 hrs)	Duration (25 Hrs)
1. Demonstrate impressive appearance and grooming	1. Describe the importance of dressing appropriately, looking decentand positive body language 2. Describe the term grooming 3. Prepare a personal grooming checklist 4. Describe the techniques of self- exploration	1. Demonstration of impressive appearance and groomed personality 2. Demonstration of the ability to self- explore	**10**
2. Demonstrate teamwork skills	1. Describe the important factors that influence in team building 2. Describe factors influencing team work	1. Group discussion on qualities of a good team 2. Group discussion on strategies that are adopted for team building and team work	**10**
3. Apply time managem ent strategies and techniques	1 Meaning and importance of Time management – setting and prioritizing goals, creating a schedule, makinglists of tasks,	1. Game on time management 2. Checklist preparation 3. To-do-list preparation	**05**

	balancing work and leisure, using different optimization toolsto break large tasks into smaller tasks.		
Total			**25**

Unit 3: Information and Communication Technology Skills - III			
Learning Outcome	**Theory(08 hrs)**	**Practical(12 hrs)**	**Duration (20 Hrs)**
1. Create a document on word processor	1. Introduction to word processing. 2. Software packages for word processing. 3. Opening and exiting the word processor. 4. Creating a document	1. Demonstration and practice of the following: • Listing the features of word processing • Listing the software packages for word processing • Opening and exit the word processor • Creating a document	**10**
2. Edit, save and print a document in wordprocessor	1. Editing text 2. Wrapping and aligning the text 3. Font size, type and face. 4. Header and Footer 5. Auto correct 6. Numbering and bullet 7. Creating table 8. Find and replace 9. Page numbering. 10. Printing document. 11. Saving a document in various formats.	1. Demonstration and practising the following: • Editing the text • Word wrapping and alignment • Changing font type, size and face • Inserting header and footer • Removing header and footer 1. Using autocorrect option 2. Insert page numbers and bullet 3. Save and print a document	**10**
Total			**20**

Unit 4: Entrepreneurial Skills - III			
Learning Outcome	**Theory(10 hrs)**	**Practical(15 hrs)**	**Duration (25 Hrs)**
1. Describe the significance of entrepreneurial values and attitude	1. Values in general andentrepreneurial values Entrepreneurial value orientation with respect to innovativeness,	1. Listing of entrepreneurial values by the students. 2. Group work on identification of entrepreneurial values and their roles after listing or reading 2-3	

	independence, outstanding performance and respect for work	stories of successful entrepreneur 3. Exhibiting entrepreneurial values in Ice breaking, rapport building, group work and home assignments	**10**
2. Demonstrate the knowledge of attitudinal changes required to become an entrepreneur	1. Attitudes in general and entrepreneurial attitudes 2. Using imagination/ intuition 3. Tendency to takemoderate risk 4. Enjoying freedom of expression and action 5. Looking for economic opportunities 6. Believing that we canchange the environment 7. Analyzing situation and planning action Involving in activity	1. Preparing a list of factors that influence attitude in general and entrepreneurial attitude 2. Demonstrating and identifying own entrepreneurial attitudes during the following micro lab activities like thematic appreciation test 3. Preparing a short write-up on "who am I" 4. Take up a product and suggest how its features can be improved Group activity for suggesting brand names, names of enterprises, etc.	**15**
Total			**25**

Unit 5: Green Skills - III			
Learning Outcome	**Theory (07 hrs)**	**Practical (08 hrs)**	**Duration (15 Hrs)**
1. Describe importance ofmain sector ofgreen economy	1. Main sectors of green economy- E-waste management, green transportation, renewalenergy, green construction, water management Policy initiatives for greening economy in India	1. Preparing a poster on any one of the sectorsof green economy Writing a two-page essay on important initiatives taken in India for promoting green economy	**08**
2. Describe the major green Sectors/Areasand the role ofvarious stakeholder ingreen economy	1. Stakeholders in greeneconomy 2. Role of government and private agencies ingreening cities, buildings, tourism, industry, transport,	1. Preparing posters on green Sectors/Areas: cities, buildings, tourism, industry, transport, renewable energy, waste management, agriculture, water, forests and fisheries	**07**

	renewable energy, waste management, agriculture, water, forests and fisheries		
Total			**15**

Part B: Vocational Skills

S. No.	Units	Duration (Hrs.)
1	Unit 1: Introduction to the sector and the job role	20
2	Unit 2: Basics of plumbing	30
3	Unit 3: Preparation for plumbing installation and maintenance	25
4	Unit 4: Installation of water supply system	45
5	Unit 5: Installation of drainage system	45
	Total	**165**

Unit 1 : Introduction to the sector and the job role

Learning Outcome	Theory	Practical	Duration *20 (Hrs)*
1. Understand the importance of the plumbing industry	1. Plumbing industry and its importance. 2. Role of water management and plumbing skill council	**1.** List the plumbing industry Identify and list the name of different logo of plumbing industry products	**04**
2. Employment potential in plumbing industry	1. Job opportunities and demand in the field of plumbing industries	1. List out the different types of job in plumbing sector	**03**
3. Understand the responsibilities of plumber general	1. Duties and responsibilities of plumber general	1. List the responsibilities of plumber general	**02**
4. Explain the process of water flow in domestic household and commercial setups	1. Water flow system in domestic building Water flow system in commercial setups	1. List the components of water flow system in domestic building List the components used in water flow system for commercial setups	**05**
5. Describe the application of various types of plumbing system in residential and commercial setups	1. Application of various types of plumbing system in residential. 2. Application of various types of plumbing system in commercial setups.	1. Identify and make a list of various types of plumbing system in residential. 2. Identify and make a list of various types of plumbing system in commercial setups.	**06**
Total			**20**

Unit 2: Basics of Plumbing

Learning Outcome	Theory	Practical	Duration 30 (Hrs)
1. Symbols and terminology used in plumbing installation	1. Symbols and terminology used in plumbing installation	1. Draw the symbols used in plumbing products and plumbing installation	**04**
2. Standards applicable to piping installation	1. Indian standards like ISI/BIS applicable to piping installation	1. Make a list of Indian standards like ISI/BIS applicable to piping installation	**02**
3. Importance of accuracy in measurement and calculation of plumbing work	1. Techniques of accuracy in measurement and calculation of plumbing work	1. Measures the plumbing work 2. Calculate the cost of material used in plumbing work 3. Calculate the total cost of labour and material	**07**
4. Pipes, pipe fittings and supporting material used in plumbing and their characteristic and uses	1. 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	1. 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	**06**
5. Plumbing tools and equipment's, lifting /load shifting equipment's	1. 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.	1. 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.	**05**
6. Explain the importance of water properties	1. Importance of water properties, pressure and flow rate. 2. Capillary action and thermal expansion in plumbing	1. List the water properties for plumbing system 2. Measure the pH of water. 3. Read the water	**06**

		pressure with the help of water pressure gauge	
Total			**30**

Unit 3: Preparation for plumbing installation and maintenance			
Learning Outcome	**Theory**	**Practical**	**Duration 25 (Hrs)**
1. Discuss the importance Plumbing drawings	1. Role of plumbing drawings 2. Layout 3. Measurements from drawing and plans associated with the plumbing	1. 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.	**09**
2. Explain the planning of work schedule and work-related information	1. Importance of the planning of work schedule and work-related information	1. Prepare a work plan as per specified timelines.	**03**
3. Describe the importance of safe handling and storage of plumbing material	1. Importance of safe handling and storage of plumbing material	1. Perform 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.	**06**
4. List measures to avoid air and water contamination,	1. Air and water contamination, erosion and sedimentation	1. Identify the Air and water contamination, erosion and sedimentation	**02**

erosion and sedimentation			
5. Discuss the role and impact of not following define procedures.	1. Disadvantages and impact of not following define procedures.	1. List the disadvantages and impact of not following define procedures	**02**
6. Outline the process of the reporting and handling hazards at the work place	1. Outline the process of the reporting and handling hazards at the work place	1. Write an application of reporting of handling hazards at the work place.	**03**

Unit 4: Installation of water supply system

Learning Outcome	Theory	Practical	Duration 45 (Hrs)
1. Explain the process of water distribution in municipal, residential, and private setups.	1. Process of water distribution in municipal, residential, and private setups.	1. 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**
2. Describe the piping system layouts for varioustypes of water supply systems.	1. State the piping system layouts for varioustypes of water supply systems.	1. List the piping system layouts for various types of water supply systems.	**02**
3. Describe the various techniques of installing the water piping system in a building.	1. Various techniques of installing the water piping system in a building such as over ground piping, underground piping, piping embedded in concrete, concealed piping, wall mounted piping.	1. 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 installation of water supply piping, fittings and components in buildings.	**08**

4. Explain the properties of the different types of supports, hangers and restraints used in water supply plumbing systems.	1. Properties of the different types of supports, hangers and restraints used in water supply plumbing systems.	1. Write the properties of the different types of supports, hangers and restraints used in water supply plumbing systems.	**01**
5. Describe the characteristics of metal used in various plumbing materials and the fabrication methods compatible with them.	1. Characteristics of metal used in various plumbing materials and the fabrication methods compatible with them.	1. Identify and list the characteristics of metal used in various plumbing materials and the fabrication methods compatible with them.	**01**
6. Explain the process of electrolysis and problems associated with the use of dissimilar metals.	1. Process of electrolysis and problems associated with the use of dissimilar metals.	1. Identify the process of electrolysis 2. List the problems associated with the use of dissimilar metals.	**02**
7. State the impact of accurate marking on the fabrication process work time and finished work quality.	1. Impact of accurate marking on the fabrication process work time and finished work quality.	1. 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.	**03**
8. Describe the measuring and marking out processes and allowances for fabrication of pipes	1. Measuring and marking out processes for fabrication of pipes. 2. Allowance to be consider in measurement	1. Measure and mark the fabricated pipe. 2. Measure the allowance.	**04**
9. 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.	1. Measure the dimension such as center-to-center, end-to-center, and end-to-end of a pipe.	**03**
10. Describe the types, characteristics and the application of different pipe fittings and fixture supports.	1. Type, characteristics and application of different pipe fittings and fixture supports.	1. List the types, characteristics. 2. List the different pipe fittings and fixture supports.	**02**

11. Discuss the various fixing and jointing techniques for water supply piping installations.	1. Various fixing and jointing techniques for water supply piping installations.	1. Identify the various fixing and jointing for water supply piping installations.	**02**
12. Explain the principles underlying various fit-off processes.	1. Principles underlying various fit-off processes.	1. 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.	**03**
13. State the importance of ensuring alignment and balance in piping installations	1. Importance of ensuring alignment and balance in piping installations.	1. Do the practices of alignment and balance in piping installations.	**02**
14. Describe the test procedures to check proper functioning of the pipework installed.	1. Test procedures to check proper functioning of the pipework installed.	1. Do the testing to check proper functioning of the pipework installed.	**02**
15. Describe the checks and procedures to be conducted before commissioning	1. Checks and procedures to be conducted before commissioning.	1. 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.	**04**
16. Explain the importance of reporting any difficulties as soon as they arise.	1. Importance of reporting any difficulties as soon as they arise.	1. Perform post installation activities such as clearing the work area, disposal of waste and cleaning and storage of tools and equipment.	**02**

Unit 5: Installation of drainage system

Learning Outcome	Theory	Practical	Duration 45 (Hrs)
1. Discuss the process of wastewater drainage	1. Process of wastewater drainage	1. 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. 2. Identify the various types of drainage piping systems and the pipes and fittings used in them. 3. Determine fitting requirements for installing various types of drainage pipes according to given specifications and site requirements. 4. Demonstrate the construction of chambers to accommodate drainage systems.	**03**
2. Describe the functions of the components of drainage systems.	1. Describe the functions of the components of drainage systems.		**03**
3. Describe the various types of drainage piping systems and the pipes and fittings used in them.	1. Various types of drainage piping systems and the pipes and fittings used in them.		**03**
4. Discuss the type of drainage piping systems and its components used in various types of building.	1. Discuss the type of drainage piping systems and its components used in various types of building.		**04**
5. Explain the characteristics and the application of different pipe fittings, fixture supports and fastening hardware.	1. Characteristics and the application of different pipe fittings, fixture supports and fastening hardware.	1. Perform the necessary checks on the area for laying underground, above ground and overhead piping systems.	**03**
6. Discuss the fit off, fixing and jointing techniques applicable for drainage pipes.	1. Importance of the fit off, fixing and jointing techniques applicable for drainage pipes.	1. Perform fitting activities on various types of pipes such as stoneware (SW) pipes, polyvinyl chloride (PVC) pipes, cast iron (CI) pipes, etc.	**05**
7. Explain the procedure of installing various types of drainage systems such as	1. Method of installation various types of drainage systems such as sewage, sullage, stormwater,	1. Demonstrate the installation of the various components of drainage system such as various pipes	**05**

sewage, sullage, stormwater, sub-soil drainage system, drainage for fixtures, etc.	sub-soil drainage system, drainage for fixtures, etc.	and their fittings, manholes, traps, cleanouts, catch basins, inspection chambers, soak pit etc.	
8. Identify the trap to be installed as per the type of drainage system.	1. Different types of trap as per the type of drainage system.		**02**
9. List different types of pumps used in sanitary and drainage systems and their applications.	1. Pumps used in sanitary and drainage systems and their applications.	1. 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.	**04**
10. Discuss the characteristics of the flooring using for installation and levelling of drainage system	1. Characteristics of the flooring using for installation and levelling of drainage system	1. 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.	**04**
11. Explain the importance of conducting post-installation and pre-commissioning tests and checks	1. Importance of conducting post-installation and pre-commissioning tests and checks	1. Perform the various post installation and pre-commissioning tests and checks. 2. Perform the backfilling of all excavated areas to secure the installation.	**04**
12. Describe the various post installation and pre-commissioning tests and checks.	1. Various post installation and pre-commissioning tests and checks.		**03**
13. List the signages to be put up at the site after the plumbing task has been completed.	1. Signages to be put up at the site after the plumbing task has been completed.	1. Make a list of signages.	**02**

CLASS 12

Part A: Employability Skills

S.No.	Units	Duration (Hrs)
1.	Communication Skills – IV	25
2.	Self-management Skills – IV	25
3.	Information and Communication Technology Skills-IV	20
4.	Entrepreneurial Skills – IV	25
5.	Green Skills - IV	15
	Total	**110**

Unit 1: Communication Skills - IV

Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 Hrs)
1. Describe the stepsto active listening skills	1. Importance of active listening at workplace 2. Steps to active listening	1. Demonstration of the key aspects of becoming active listener 2. Preparing posters of steps for active listening	**10**
2. Demonstrate basic writing skills	2. Writing skills to the following: • Sentence • Phrase • Kinds of Sentences • Parts of Sentence • Parts of Speech • Articles • Construction of a Paragraph	1. Demonstration and practice of writing sentences and paragraphs on topics related to the subject	**15**
Total			**25**

Unit 2: Self-management Skills – IV			
Learning Outcome	**Theory (10 hrs)**	**Practical (15 hrs)**	**Duration (25 Hrs)**
1. Describe the various factors influencing self-motivation	1. Finding and listing motives (needs and desires); 2. Finding sources of motivation and inspiration (music, books, activities); expansive thoughts; living fully inthe present moment; dreaming big	1. Group discussion on identifying needs and desire 2. Discussion on sources of motivation and inspiration	**10**
2. Describe the basicpersonality traits, types and disorders	1. Describe themeaning of personality 2. Describe how personality influence others 3. Describe basic personality traits 4. Describe common personality disorders-paranoid, antisocial, schizoid, borderline, narcissistic, avoidant, dependent and obsessive	1. Demonstrate the knowledge of different personality types	**15**
Total			**25**

Unit 3: Information and Communication Technology Skills - IV			
Learning Outcome	**Theory (10 hrs)**	**Practical (15 hrs)**	**Duration (25 Hrs)**
1. Perform tabulation using spreadsheet application	2. Introduction to spreadsheet application 3. Spreadsheet applications 4. Creating a new worksheet 5. Opening workbookand entering text 6. Resizing fonts and styles 7. Copying and moving 8. Filter and sorting	1. Demonstration and practice on the following: • Introduction to the spreadsheet application • Listing the spreadsheet applications • Creating a newworksheet • Opening the workbookand enter text • Resizing fonts and styles • Copying and move thecell data	**10**

	8. Formulas and functions 9. Password protection. 10. Printing a spreadsheet. 11. Saving a spreadsheet in various formats.	• Sorting and Filter the data • Applying elementary formulas and functions • Protecting the spreadsheet with password • Printing a spreadsheet • Saving the spreadsheet in various formats.	
2. Prepare presentation using presentation application	1. Introduction to presentation 2. Software packages for presentation 3. Creating a new presentation 4. Adding a slide 5. Deleting a slide 6. Entering and editing text 7. Formatting text 8. Inserting clipart and images 9. Slide layout 10. Saving a presentation 11. Printing a presentation document.	1. Demonstration and practice on the following: • Listing the software packages for presentation • Explaining the features of presentation • Creating a new presentation • Adding a slide to presentation. • Deleting a slide • Entering and edit text • Formatting text • Inserting clipart and images • Sliding layout • Saving a presentation • Printing a presentation document	**15**
Total			**25**

Unit 4: Entrepreneurial Skills - IV			
Learning Outcome	**Theory (10 hrs)**	**Practical (15 hrs)**	**Duration (25 Hrs)**
1. Identify the generaland entrepreneurial behavioural competencies	1. Barriers to becoming entrepreneur 2. Behavioural and entrepreneurial competencies – adaptability/decisivenes s, initiative/perseverance, interpersonal skills, organizational skills, stress management, valuingservice and diversity	1. Administering self- rating questionnaire and score responses on each of the competencies 2. Collect small story/ anecdote of prominent successful entrepreneurs 3. Identify entrepreneurial competencies reflectedin each story and connect it to the definition of behaviouralcompetencies 4. Preparation of competencies profile of students	**10**
2. Demonstrate the knowledge of self-assessment of behavioural competencies	1. Entrepreneurial competencies in particular: self - confidence, initiative, seeing and acting on opportunities, concern for quality, goal setting and risk taking, problem solving and creativity, systematic planning and efficiency, information seeking, persistence, influencingand negotiating, team building	1. Games and exerciseson changing entrepreneurial behaviour and development of competencies for enhancing self-confidence, problem solving, goal setting, information seeking, team building and creativity	**15**
Total			**25**

Unit 5: Green Skills - V			
Learning Outcome	**Theory (05 hrs)**	**Practical (10 hrs)**	**Duration (15 Hrs)**
1. Identify the role and importance ofgreen jobs in different sectors	1. Role of green jobs in toxin-free homes, 2. Green organic gardening, public transport and energy conservation, 3. Green jobs in water conservation 4. Green jobs in solar and wind power, waste reduction, reuse and recycling of wastes,	1. Listing of green jobs and preparation of posters on green jobprofiles 2. Prepare posters ongreen jobs.	**15**

	5. Green jobs in greentourism 6. Green jobs in building and construction 7. Green jobs in appropriate technology 8. Role of green jobs in Improving energy and raw materials use 9. Role of green jobs in limiting greenhouse gas emissions 10. Role of green jobs minimizing waste and pollution 11. Role of green jobs in protecting and restoring ecosystems 12. Role of green jobs in support adaptation to the effects of climate change		
Total			**15**

Part B: Vocational Skills

S.No.	Units	Duration (Hrs.)
1	Unit 1: Installation of plumbing fixtures	35
2	Unit 2: Trouble shooting and maintenance for plumbing	30
3	Unit 3: Health and safety	30
4	Unit 4: Working effectively with others	40
5	Unit 5: Optimum utilization of resources	30
	Total	**165**

Unit 1: Installation of plumbing fixtures			
Learning Outcome	**Theory**	**Practical**	**Duration 35 (Hrs)**
1. Describe the types, characteristics, materials, finishes, uses, limitations, working	1. Types, characteristics, materials, finishes, uses, limitations, working principle and performance measures of various plumbing related fixtures.	1. Show how to tally the count and quality of fixtures, parts, support material provided in the packing with the manufacturer's list or	**06**

principle and performance measures of various plumbing related fixtures.		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.	
2. List the accessories, supports and fasteners required for installing various types of washbasin, sinks, water closet, urinals, bathtubs and showers.	1. List the accessories, supports and fasteners required for installing various types of washbasin, sinks, water closet, urinals, bathtubs and showers.	1. 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.	**06**
3. List the sensor types of fittings and fixtures.	1. Sensor types of fittings and fixtures.	1. Demonstrate the installation of sensors and batteries of fixtures with sensor-based or touchless fitting and fixtures.	**03**
4. Explain the basic working principal of sensor faucet and the principles of solenoid ball valves and sensors in touch	1.Basic working principal of sensor faucet and the principles of solenoid ball valves and sensors in touch less system.		**02**

less system.			
5.Describe the correct practices for installing plumbing fixtures.	1. Correct practices for installing plumbing fixtures.	1. Apply appropriate techniques to check if all installations are properly sized, supported and functioning	**04**
6. Explain the importance of traps for the sanitary fittings, both deep seal traps and low seal traps.	1. Importance of traps for the sanitary fittings, both deep seal traps and low seal traps.	2. Demonstrate the traps for the sanitary fittings, both deep seal traps and low seal traps.	**04**
7. Explain the working and use of conservancy, water carriage and the combination system.	1. Working and use of conservancy, water carriage, and the combination system.	1. Draw the image on working and use of conservancy, water carriage and the combination system.	**03**
9. **Discuss alignment and elevation techniques used in plumbing systems.**	1. Alignment and elevation techniques used in plumbing systems.	1. Perform alignment and levelling of supports and fixtures installed.	**05**
10. List the codes, standards and regulations applicable for the installation of plumbing fixtures.	1. Codes, standards and regulations applicable for the installation of plumbing fixtures.	1. List the codes, standards and regulations applicable for the installation of plumbing fixtures.	**02**
Total			

Unit 2 : Troubleshooting and maintenance for plumbing

Learning Outcome	Theory	Practical	Duration 30 (Hrs)
1. List the various types of faults (such as leakages, improper joints, broken sewer; dripping faucets and water lines, etc.) associated	1. 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.).	1. Show how to detect faults in various types of plumbing systems and fixtures.	**04**

with plumbing systems (such as aerators, septic systems etc.).			
2. **List the testing procedures to be performed to check proper functioning of the fixtures and pipework installed.**	1. Testing procedures to be performed to check proper functioning of the fixtures and pipework installed.	1. Demonstrate the procedures involved in repair and rectification of common faults within the pipes, plumbing fixtures, drainage and water supply systems.	**05**
3. **State the remedial and preventive measures for common plumbing problems with respect to fixtures, pipes and fittings.**	1. Remedial and preventive measures for common plumbing problems with respect to fixtures, pipes and fittings.	1. List the remedial and preventive measures for common plumbing problems with respect to fixtures, pipes and fittings.	**02**
4. **Discuss correct practices for troubleshooting and maintenance for plumbing fixtures and systems.**	1. Correct practices for troubleshooting and maintenance for plumbing fixtures and systems.	1. List the practices for troubleshooting and maintenance for plumbing fixtures and systems.	**04**
5. **Explain the application of mechanical and hydraulic principles for clearing blockages.**	1. Application of mechanical and hydraulic principles for clearing blockages.	1. Demonstrate cleaning and clearance related activities after completion of work.	**03**
6. **List the methods of corrosion protection such as coatings and tape.**	1. Methods of corrosion protection such as coatings and tape.	1. Demonstrate the methods of corrosion protection such as coatings and tape.	**06**
7. **Discuss common organisational policies related to costing, scheduling, procurement and documentation for plumbing maintenance and repair work.**	1. Common organisational policies related to costing, scheduling, procurement and documentation for plumbing maintenance and repair work.	1. 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.	**06**
Total			**30**

Unit 3 : Health and safety			
Learning Outcome	**Theory**	**Practical**	**Duration 30 (Hrs)**
1. Differentiate between risks and hazards. (KU4)	1. Differentiate between risks and hazards. (KU4)	1. Perform inspection of a work area in order to identify risks and hazards. (PC1)	**02**
2. Discuss the specific safety and health related problems faced in domestic, commercial and institutional setups.	1. Specific safety and health related problems faced in domestic, commercial and institutional setups.	1. Apply various health and safety precautions to be taken during plumbing work.	**02**
3. List the various types of hazards (such as physical, fire, chemical compounds and electrical) that could affect the work process.	1. Various types of hazards (such as physical, fire, chemical compounds and electrical) that could affect the work process.	1. Apply personal and workspace hygiene and sanitation practices.	**02**
4. List the various hazardous environments and common hazards that can occur during plumbing installation and maintenance along with their precautions and remedial measures.	1. Various hazardous environments and common hazards that can occur during plumbing installation and maintenance along with their precautions and remedial measures.	1. List the various hazardous environments and common hazards that can occur during plumbing installation.	**01**
5. Discuss the importance of various types of personal protective equipment (PPE).	1. Importance of various types of personal protective equipment (PPE).	1. Make an image of various types of personal protective equipment (PPE).	**02**
6. Discuss where the general health and safety equipment commonly is kept at the workplace.	1. General health and safety equipment commonly is kept at the workplace.	1. Locate and identify the place where the general health and safety equipment commonly is kept at the workplace.	**02**
7. Explain the various types of safety signs and their significance in the work process.	1. 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**
8. Discuss various causes of fire and precautionary activities to	1. Various causes of fire and precautionary activities to prevent the fire accident.	1.Demonstrate the correct use of fire extinguishers	**04**

prevent the fire accident.			
9. 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).	1. 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).	1. Make a list of different items used for fire protection.	**02**
10. Describe rescue techniques applied during a fire hazard or electrocution.	1. Rescue techniques applied during a fire hazard or electrocution.	1. Dramatize workplace emergency and evacuation procedures using role plays.	**03**
11. Discuss appropriate basic first aid treatment relevant to the condition e.g. shock, electrical shock, bleeding, minor burns, poisoning, eye injuries etc.	1. Basic first aid treatment relevant to the condition e.g. shock, electrical shock, bleeding, minor burns, poisoning, eye injuries etc.	1. Perform appropriate first aid treatment for various conditions such as bleeding, burns, choking, electric shock and poisoning and injury. 2. Dramatize, using role play, safe methods of freeing a person from electrocution.	**04**
12. Discuss potential injuries and health problems associated with incorrect handing of tools and equipment.	1. Potential injuries and health problems associated with incorrect handing of tools and equipment.	1. Demonstrate the process of providing cardio pulmonary resuscitation (CPR).	**03**
Total			**30**

Unit 4 : Working effectively with others			
Learning Outcome	**Theory**	**Practical**	**Duration 40 (Hrs)**
1. State the importance of effective communication in the workplace.	1. State the importance of effective communication in the workplace.	1. Demonstrate techniques used for ensuring timely receipt of complete information and instructions from appropriate sources. 2. Apply practices that improve effectiveness while providing information	**02**
2. Describe the typical organisational hierarchy and the various categories of people that one is required to communicate and coordinate with.	1. Typical organisational hierarchy and the various categories of people that one is required to communicate and coordinate with.		**02**
3. List various components of effective communication.	1. List various components of effective communication.	1. Demonstrate the use of inclusive language (verbal, non-verbal and written) that is gender, disability and culturally sensitive. 2. Illustrate the use of appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism	**02**
4. 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.		**02**
5. State the importance of teamwork and developing effective working relationships for professional success.	1. Importance of teamwork and developing effective working relationships for professional success.	1. Dramatise a situation to show effective teamwork. 2. Dramatize (through role-play) disciplined behaviours at the workplace. 3. Dramatize (through role-play) the process of scalation of grievances and problems.	**03**
6. **Discuss the importance and ways of managing interpersonal conflict effectively.**	1. Importance and ways of managing interpersonal conflict effectively.		**03**
7. **Discuss how to express and address grievances appropriately and effectively.**	1. Discuss how to express and address grievances appropriately and effectively.		**03**
8. **State the importance of ethics and discipline for professional success.**	1. State the importance of ethics and discipline for professional success.		**01**

9. Discuss the legislation, standards, policies, and procedures relevant to own employment and performance conditions.	1. Discuss the legislation, standards, policies, and procedures relevant to own employment and performance conditions.	1. List the legislation, standards, policies, and procedures relevant to own employment and performance conditions.	**02**
10. Discuss importance of dress code in organisations.	1. Discuss importance of dress code in organisations.	2. Identify the dress code in organisations.	**02**
11. Explain the impact of gender, disability, cultural and age-related biases, stereotyping at the workplace and in society.	1. Impact of gender, disability, cultural and age-related biases, stereotyping at the workplace and in society.	1. Recognize indicators of harassment and discrimination based on gender, disability, caste, religion, colour, sexual orientation and culture at workplace. 2. Demonstrate practices to eliminate personal bias based on gender, disability, caste, religion, colour, sexual orientation and culture from routine transactions.	**02**
12. List the different types of disabilities and the challenges faced by persons with disability (PwD).	2. List the different types of disabilities and the challenges faced by persons with disability (PwD).		**03**
13. State the laws, acts, provisions and schemes defined for PwD by the Government bodies.	3. State the laws, acts, provisions and schemes defined for PwD by the Government bodies.		**02**
14. Discuss gender, disability and cultural biases, stereotypes and impact on others	4. Discuss gender, disability and cultural biases, stereotypes and impact on others		**02**
15. Discuss basic gender concepts such as gender power relations, gender roles, access and control, gender sensitivity, gender equity and equality.	5. Discuss basic gender concepts such as gender power relations, gender roles, access and control, gender sensitivity, gender equity and equality.		**02**
16. Discuss the importance of gender sensitivity and equality.	6. Discuss the importance of gender sensitivity and equality.		**02**
17. List the indicators of harassment and discrimination based on gender,	7. List the indicators of harassment and discrimination based on gender, disability, caste,		**02**

disability, caste, religion or culture that occurs at a typical workplace.	religion or culture that occurs at a typical workplace.		
18. State general organisational norms and procedures applied to protect against harassment and discrimination.	8. State general organisational norms and procedures applied to protect against harassment and discrimination.		**01**
19. Discuss the importance of reporting incidents of harassment and discrimination to appropriate authority.	9. Discuss the importance of reporting incidents of harassment and discrimination to appropriate authority.		**02**
Total			**40**

Unit 5: Optimum Utilization of Resources

Learning Outcome	Theory	Practical	Duration 30 (Hrs)
1. Discuss the practices and impact of inefficient utilization of material and water.	1. Discuss the practices and impact of inefficient utilization of material and water.	1. Identify ways to optimize usage of water and other materials in various tasks/activities/processes. 2. Perform inspection to check for spills/leakages at a workplace. 3. Apply various material conservation practices with respect to plumbing work. 4. Perform inspection of the work area for improperly connected electrical equipment. 5. Apply appropriate techniques to use energy/electricity in an optimum way. 6. Categorize waste into dry, wet, recyclable, non-recyclable and items of single-use plastics. Employ	**02**
2. Describe ways of efficiently managing material and water in the process.	1. Describe ways of efficiently managing material and water in the process.		**02**
3. Explain the basics of electricity.	1. Explain the basics of electricity.		**01**
4. List common electrical and thermal equipment used in a plumbing workplace.	1. List common electrical and thermal equipment used in a plumbing workplace.		**03**
5. Describe the use of prevalent energy efficient devices.	1. Describe the use of prevalent energy efficient devices.		**02**
6. List indicators of common electrical problems.	1. List indicators of common electrical problems.		**02**
7. Discuss common practices of	1. Discuss common practices of conserving electricity.		**02**

conserving electricity.		effective waste management/ recycling practices.	
8. Explain the importance of checking if the equipment/machine is functioning normally before commencing work and ensuring it is rectified.	1. Explain the importance of checking if the equipment/machine is functioning normally before commencing work and ensuring it is rectified.		**03**
9. Explain the usage of different colours of dustbins.	1. Explain the usage of different colours of dustbins.		**02**
10. Differentiate between recyclable and non- recyclable, and hazardous waste generated.	1. Differentiate between recyclable and non-recyclable, and hazardous waste generated.		**03**
11. Discuss efficient waste management practices.	1. Discuss efficient waste management practices.		**02**
12. Discuss the common ways employed by organizations, to minimize waste generated from plumbing activities.	1. Discuss the common ways employed by organizations, to minimize waste generated from plumbing activities.		**02**
13. Discuss common sources of pollution and ways to minimize it	1. Discuss common sources of pollution and ways to minimize it		**02**
14. Explain the importance of reporting malfunctioning (fumes /sparks /emission /vibration /noise) and lapse in the maintenance of equipment on time.	1. Explain the importance of reporting malfunctioning (fumes /sparks /emission /vibration /noise) and lapse in the maintenance of equipment on time.		**02**

6. 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

7. LIST OF EQUIPMENT AND MATERIALS

The list given below is suggestive and an exhaustive list should be prepared by the vocational teacher. Only basic tools, equipment and accessories should be procured by theInstitution so that the routine tasks can be performed by the students regularly for practice and acquiring adequate practical experience.

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

8. 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:

S.No.	Qualification	Minimum Competencies	Age Limit
1.	B. Tech/BE in Civil Engineering/ Agricultural Engineering/ Mechanical Engineering 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 skills.	18-37 years (as on Jan.01 (year)) Age relaxation to be provided as per Govt. rules.

Vocational Teachers/Trainers form the backbone of Vocational Education being imparted as an integral part of Rashtriya Madhyamik Shiksha *Abhiyan* (RMSA). They are directly involved in teaching of vocational subjects and also serve as a link between the industry and the schools for arranging industry visits, On-the-Job Training (OJT) and placement.

These guidelines have been prepared with an aim to help and guide the States in engaging quality Vocational Teachers/Trainers in the schools. Various parameters that need to be looked into while engaging the Vocational Teachers/Trainers are mode and procedure of selection of Vocational Teachers/Trainers, Educational Qualifications, Industry Experience,and Certification/Accreditation.

The State may engage Vocational Teachers/Trainers in schools approved under the component of Vocationalisation of Secondary and Higher Secondary Education under RMSAin the following ways:

(i) directly as per the prescribed qualifications and industry experience suggested by thePSS Central Institute of Vocational Education (PSSCIVE), NCERT or the respective Sector Skill Council (SSC)

OR

(ii) Through accredited Vocational Training Providers accredited under the National Quality Assurance Framework (NQAF*) approved by the National Skill Qualification Committee on 21.07.2016. If the State is engaging Vocational Teachers/Trainers throughthe Vocational Training Provider (VTP), it should ensure that VTP should have been accredited at NQAF Level 2 or higher.

* *The National Quality Assurance Framework (NQAF) provides the benchmarks or quality criteria which the different organisations involved in education and training must meet in order to be accredited by competent bodies to providegovernment-funded education and training/skills activities. This is applicable to all organizations offering NSQF-compliant qualifications.*

The educational qualifications required for being a Vocational Teacher/Trainer for a particular job role are clearly mentioned in the curriculum for the particular NSQF compliant job role. The State should ensure that teachers / trainers deployed in the schools have relevant technical competencies for the NSQF qualification being delivered. The VocationalTeachers/Trainers preferably should be certified by the concerned Sector Skill Council for the particular Qualification Pack/Job role which he will be teaching. Copies of relevantcertificates and/or record of experience of the teacher/trainer in the industry should be kept as record.

To ensure the quality of the Vocational Teachers/Trainers, the State should ensure that a standardized procedure for selection of Vocational Teachers/Trainers is followed. The selection procedure should consist of the following:

(i) Written test for the technical/domain specific knowledge related to the sector;
(ii) Interview for assessing the knowledge, interests and aptitude of trainer through a panel of experts from the field and state representatives; and
(iii) Practical test/mock test in classroom/workshop/laboratory.

In case of appointment through VTPs, the selection may be done based on the above procedure by a committee having representatives of both the State Government and the VTP.

The State should ensure that the Vocational Teachers/ Trainers who are recruited should undergo induction training of 20 days for understanding the scheme, NSQF framework and Vocational Pedagogy before being deployed in the schools.

The State should ensure that the existing trainers undergo in-service training of 5 days every year to make them aware of the relevant and new techniques/approaches in their sector and understand the latest trends and policy reforms in vocational education.

The Head Master/Principal of the school where the scheme is being implemented should facilitate and ensure that the Vocational Teachers/Trainers:

(i) Prepare session plans and deliver sessions which have a clear and relevant purposeand which engage the students;
(ii) Deliver education and training activities to students, based on the curriculum to achieve the learning outcomes;
(iii) Make effective use of learning aids and ICT tools during the classroom sessions;
(iv) Engage students in learning activities, which include a mix of different methodologies, such as project-based work, team work, practical and simulation-based learning experiences;
(v) Work with the institution's management to organise skill demonstrations, site visits, on-job trainings, and presentations for students in cooperation with industry, enterprises and other workplaces;
(vi) Identify the weaknesses of students and assist them in up-gradation of competency;
(vii) Cater to different learning styles and level of ability of students;
(viii) Assess the learning needs and abilities, when working with students with different abilities
(ix) Identify any additional support the student may need and help to make special arrangements for that support;
(x) Provide placement assistance

Assessment and evaluation of Vocational Teachers/Trainers is very critical for making them aware of their performance and for suggesting corrective actions. The States/UTs should ensure that the performance of the Vocational Teachers/Trainers is appraised annually. Performance based appraisal in relation to certain pre-established criteria and objectives should be done periodically to ensure the quality of the Vocational Teachers/Trainers. Following parameters may be considered during the appraisal process:

1. Participation in guidance and counselling activities conducted at Institutional, District and State level;
2. Adoption of innovative teaching and training methods;
3. Improvement in result of vocational students of Class X or Class XII;
4. Continuous up-gradation of knowledge and skills related to the vocational pedagogy, communication skills and vocational subject;
5. Membership of professional society at District, State, Regional, National and International level;
6. Development of teaching-learning materials in the subject area;
7. Efforts made in developing linkages with the Industry/Establishments;
8. Efforts made towards involving the local community in Vocational Education
9. Publication of papers in National and International Journals;
10. Organisation of activities for promotion of vocational subjects;
11. Involvement in placement of students/student support services.

9. LIST OF CONTRIBUTORS

1. Er. Hemant Wadikar, Lecturer, Building Maintenance, Swami Vivekanand Jr. College (HSC Vocational) Sindhi Society, Chembur, Mumbai-400071, Maharashtra, India
2. Dr. Abhay Kumar Jha, Head, Department of Civil Engineering, Laxmi Narain College of Technology and Science, Raisen Road, Bhopal-462044, MP, India
3. Ms. Pooja Sharma, Vice President, IPSC, Okhla Industrial Area, Phase-I, New Delhi, India
4. Ms. Gunjan Aneja, Operations, Manager, IPSC, Okhla Industrial Area, Phase - I, New Delhi, India
5. Dr. Satyendra Thakur, Assistant Professor. Engineering and Technology Department, PSS Central Institute of Vocational Education, Bhopal
6. Dr. Manoj Arya, Associate Professor, MANIT, Bhopal
7. Er. Neeraj Bhandari, Assistant Professor. Engineering and Technology Department, PSS Central Institute of Vocational Education, Bhopal
8. Prof. Saurabh Prakash, Coordinator and Head, Engineering and Technology Department, PSS Central Institute of Vocational Education, Bhopal.

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION
Shyamla Hills, Bhopal- 462 013, M.P., India