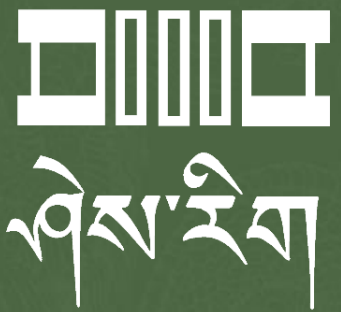


National School Curriculum

# INSTRUCTIONAL GUIDE FOR TVET (PLUMBING)

CLASSES XI & XII



Department of Curriculum and Professional Development  
Ministry of Education, Royal Government of Bhutan



“Your parents, relatives, and friends would be very proud of what you have achieved. At your age, to have completed your studies is your personal accomplishment. Your knowledge and capabilities are a great asset for the nation. I congratulate you for your achievements. Finally, your capabilities and predisposition towards hard work will invariably shape the future of Bhutan. You must work with integrity, you must keep learning, keep working hard, and you must have the audacity to dream big.”

*- His Majesty Jigme Khesar Namgyel Wangchuck*

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**Published by**

Department of Curriculum and Professional Development  
Ministry of Education  
Royal Government of Bhutan  
Thimphu, Bhutan.

**Provisional Edition 2021****First Edition 2022**

[www.education.gov.bt](http://www.education.gov.bt)

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ISBN 978-99936-0-651-2

## Acknowledgements

The Department of Curriculum and Professional Development (DCPD) would like to acknowledge the assistance provided by the Department of School Education, MoE, Royal Government of Bhutan in the development of Technical and Vocational Education and Training National School Curriculum Instructional Guide for classes IX - XII. The DCPD also extends its sincere gratitude to all the schools and individuals for their invaluable contributions towards the development of this instructional guide. The DCPD also wishes to extend heartfelt gratitude to the World Bank for rendering financial services during the course of the development of this instructional guide.

The DCPD also genuinely acknowledges the retrieval and use of contents and resources, either in part or whole, from relevant websites and other forms of sources with assurance that these resources will be used exclusively for educational purposes.

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## Foreword

COVID-19 has suddenly caused unforgiving disruptions in public education all over the world and brought about threats of fragmentation due to disparities in accessibility and connectivity in many systems. In Bhutan too, continuity of education and learning has been severely affected as a result of nationwide school closures and due to restrictions and health protocols. The disruptions have led to challenges in many existing patterns and trends in education resulting in a massive shift away from teaching and learning in traditional settings.

In the new normal education, human interaction and well-being are a priority. Digital technology that enables communication, collaboration and learning across distance, is a source of innovation and expanded potentials. As we embrace this exceptional opportunity to transform the world, and as we reimagine the organization of our educational institutions and learning environments, we need to think about where we want to go.

In the post COVID 19 era, we must prioritize the development of the whole person not just academic knowledge. Inspiration for the change can be drawn from the 1996 Delors report, *Learning the treasure within*, in its specification of four pillars of learning as “learning to know”, “to do”, “to be”, and “to live together”. Therefore, curricula must be increasingly perceived as an integrated and based on themes and problems that allows learners to learn to live in peace with our common humanity and our common planet. This has the potential in the development of a strong base of knowledge about one’s self and about the world and find purpose and be better able to participate in social and political milieu.

The National School Curriculum is, not just a mere response to the pandemic, but also a culmination of the curriculum reform work for the last four years by the then Royal Education Council. It is an attempt to transform education from the teaching of “what” to learning of “how” and “why” towards empowering learners with the transversal competencies and the 21st century skills, and preparing them to be lifelong learners. We are optimistic that this move orients our education process towards nurturing nationally rooted and globally competent citizens.

Wish all our learners and teachers a life enriching experiential teaching and learning.  
Tashi Delek.



**Tashi Namgyel**  
**Director**

## Introduction

Technical and Vocational Education and Training (TVET) is aimed at providing knowledge and skills for employment. It comprises education, training and skills development related to a wide range of occupational fields, production, services and livelihood. The Department of Curriculum and Professional Development, Ministry of Education envisages that the TVET curriculum has a place in the mainstream education system, as it is the case in most of the education systems of the developed world. The formal Technical and Vocational Education and Training (TVET) began in 1965 at Don Bosco Technical School (DBTS), in Kharbandi (presently known as Rinchening) in Phuntsholing. Even after that, major curriculum reform was planned by the then Department of Curriculum Research and Development (DCRD) in an attempt to make education relevant to the Bhutanese society through diversification of Secondary Education Curriculum in the schools, which included the introduction of TVET.

As per 'National Education Framework' developed collaboratively by the Royal Education Council (REC) and the Ministry of Education (MoE), it provides a pathway on integrating technical/vocational education in the mainstream school education curriculum and as elective subjects in higher classes (NEF, 2009; page 64).

With the collaborative efforts of the Ministry of Labour and Human Resources and the erstwhile Department of Curriculum Research and Development, Vocational Curriculum has been introduced in the schools with assistance from TTIs since 2011. After the first MoU that was signed between MoE and MoLHR in 2011, the second MoU was signed again in 2014, to improve technical/vocational courses. The technical/vocational courses offered by the TTIs/IZCs are adapted and redesigned and are offered in schools aligning to the 'Bhutan Education Blue Print' 2014-2024, which recommends upscaling and diversification of TVET in schools through the provision of alternative pathways in schools and the tertiary education systems, owing to the limited access to such courses, despite the growing demand for technical skills in the country.

The resolutions of the National School Curriculum Conference 2016, also strongly emphasised the need to upscale and deepen TVET. Accordingly, the TVET framework is developed from classes PP to XII, schools equipped with necessary resources and instructors trained. Tripartite MoU among the then REC, MoE and MoLHR was also signed in 2018 to implement the programmes collaboratively.

Although the TVET curriculum is competency based with more emphasis on hands-on experience, further improvements have been made taking care of cognitive and affective domains besides psychomotor. Teaching and learning approaches have also been enriched with the recommendation to use ICT and online resources. Since the pandemic (COVID-19) has resulted in the closure of schools, it has taught us lessons to be prepared for such an untoward situation in the future. Thus, the National School Curriculum Instructional Guide is prepared not only to encourage blended learning but also to facilitate remote learning. The guide would help the schools to implement the curriculum effectively without limiting to contact teaching/learning besides using a variety of pedagogies.



## Purpose of the Instructional Guide

Among the many definitions of 'curriculum' this Instructional Guide underscores the meaning of curriculum as a standard and competency-based sequence of planned learning experiences where learners practise and achieve the proficiency in applying the learning experiences in real life scenarios. These proficiencies, in the curriculum framework, have been stated as "competencies" and 'objectives" for each class. In keeping with the principle, 'less is more' as stated the National School Curriculum, the contents of the curriculum have been reworked, so that learners can be engaged more in activities that can lead to the acquisition of required skills rather than having them 'cover the syllabus'.

This Instructional Guide believes that the classroom teachers, as professional individuals, can make the most authentic and reliable judgment about each learner's learning needs and the learning experiences to be provided to propel the learners in the learning continuum. With these beliefs and principles as the background, the following are the purposes of this document.

- Facilitate learners acquire required skills and competencies.
- Strengthen blended learning, including flipped classroom with multimedia, digital pedagogies and ICT devices and websites as tools to share the responsibility of learning amongst the learners, teachers, the parents and other stakeholders.
- Facilitate the use of Continuous Formative Assessment for learning using diverse appropriate assessment techniques and tools commensurate with individual differences in learning, and gather evidence to guide planning of educational programmes and activities for learners.
- Promote inclusive learning through the blended learning which facilitates learning anywhere, any time with the learner being responsible for the learning.
- Provide suggestive means of acquiring required skills by building interrelationship among, and through, the integration of the four strands of the curriculum.
- Help teachers assume the roles of facilitator, guide, motivator and evaluator.
- Guide teachers, parents and other stakeholders in helping learners achieve their potential.
- Empower teachers to design their own 'course of study' or 'class curriculum' for their students in line with the National School Curriculum Framework.
- Enhance sharing the burden of responsibility and accountability for learning amongst the stakeholders, including the learners themselves.

In this age of advanced communication and information technology, contents are widely available from a number of sources. Therefore, the teachers can select, structure and sequence the contents as required to best suit the learners' need while maintaining coherence and consistency. In other words, while the contents of the curriculum are negotiable, the competencies and objectives are not. While, teachers may have access to number of materials, it should be kept in mind that the teaching and learning should be focused on achieving the competencies rather than 'covering of the syllabus'. The teaching learning materials should be used as means to create a learning environment that is competency-based where the learners need to master the skills presented to them. While designing lesson plans and teaching learning activities, teachers need to ensure that the materials are relevant and appropriate for the given task.

The assessment should be competency-based wherein the teachers should assess the learners' mastery of the skills stated as competencies and objectives for each class. Teachers should use appropriate assessment tools and techniques depending on the nature of the learning activities. The learners should be clearly informed about the success criteria, the areas of assessment and the tools to be used so that they know exactly what tasks are to be performed or expected of them. In the process of the performance, the teacher should continuously provide feedback and, if necessary, modify instructions. Efforts have to be made to ensure that every learner has mastered the skills.

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## Class XI

### Chapter 2 : Installing pipes and fittings

#### A. Competency/Competencies:

- ✓ Prepare layout as per the drawing.

#### B. Learning objectives/Topic:

Learning objectives	Topic
2.13.1 Define layout 2.13.2 Explain the importance of checking alignment 2.13.3 List the types of marking tools and materials 2.13.4 List the measuring tools 2.13.5 State the types of layout and their importance 2.13.6 Prepare layout 2.13.7 <i>Ensure correct interpretation of drawing</i> 2.13.8 <i>Ensure appropriate use of hand gloves and apron</i> 2.13.9 <i>Ensure proper handling of layout tools Work in team</i>	<b>2.13 Preparing layout</b>  <b>Overview:</b> The learners can prepare layout by using different types of marking tools and materials.

#### C. Learning Experiences:

- ✓ Make learners go through INFORMATION SHEET 2.13 and OPERATION SHEET 2.13
- ✓ Demonstrate on OPERATION SHEET 2.13
- ✓ Provide guided practices on OPERATION SHEET 2.13
- ✓ Make learners carry out group practices on OPERATION SHEET 2.13
- ✓ Make learners go through INFORMATION SHEET 2.13 and OPERATION SHEET 2.13
- ✓ Provide handouts to learners through Google Classroom or any other social media platforms.
- ✓ Provide PPT on the importance of checking alignment, types of layout, and its importance.

#### D. Assessment:

- ✓ Make learners perform OPERATION SHEET 2.13
- ✓ Make learners solve the SAMPLE SELF CHECK 2.13 that fulfills objectives and competency.
- ✓ Give additional questions from CBLM.
- ✓ Assess the learner's ability through conducting oral OR written tests.

- ✓ Make learners solve the SAMPLE SELF CHECK 2.13 that fulfills objectives and competency. Send answers through Google Classroom or any other social media platforms.
- ✓ Give additional questions from CBLM.
- ✓ Assess learners through oral/viva voice.
- ✓ Written test through Kahoot.

**E. Resources:**

- ✓ CBLM
- ✓ Handouts
- ✓ PPT

**A. Competency/Competencies:**

- i. Cut channel to lay pipes as per job requirement.

**B. Learning objectives/Topic:**

Learning objectives	Topic
2.14.1 Explain the method of cutting the channel 2.14.2 Explain consequences of irregular cutting 2.14.3 Explain the Purpose of channeling 2.14.4 List types of channel cutting tools and equipment 2.14.5 Cut channel 2.14.6 <i>Ensure proper handling of tile cutting machine</i> 2.14.7 <i>Ensure appropriate use of hand gloves, dust mask, earplug, goggles, and apron</i> 2.14.8 <i>Ensure proper disposal of waste product</i>	<b>2.14 Cutting channel</b>  <b>Overview:</b> The learners can cut channel by using types of cutting tools and equipment besides knowing the purpose of channel.

**C. Learning Experiences:**

- ✓ Make learners read INFORMATION SHEET 2.14 and OPERATION SHEET 2.14
- ✓ Share the web link <https://youtu.be/WtTJE6f33QY> and <https://youtu.be/EQ085DcVDrc> for further explanation on the cutting channel.
- ✓ Demonstrate on OPERATION SHEET 2.14
- ✓ Make learners carry out group practice on OPERATION SHEET 2.14.
- ✓ Make learners go through INFORMATION SHEET 2.14 and OPERATION SHEET 2.14

- ✓ Share the web link <https://youtu.be/WtTJE6f33QY> and <https://youtu.be/EQ085DcVDrc> for further explanation on the cutting channel.
- ✓ Provide handouts to learners through Google Classroom or any other social media platforms.

**D. Assessment:**

- ✓ Make learners perform OPERATION SHEET 2.14
- ✓ Make learners solve the SAMPLE SELF CHECK 2.14 that fulfills objectives and competency.
- ✓ Frame questions from CBLM and other resources-Google/YouTube.
- ✓ Assess the learners' ability to cut channels by preparing a rubric.
- ✓ Make learners solve the SAMPLE SELF CHECK 2.14 that fulfills objectives and competency. Send answers through Google Classroom or any other social media platforms.
- ✓ Give additional questions from CBLM and other resources-Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms.
- ✓ Assess learner through oral/viva voice
- ✓ Written test through Kahoot.

**E. Resources:**

- ✓ CBLM
- ✓ <https://youtu.be/WtTJE6f33QY> (Explanation on cutting channel).
- ✓ <https://youtu.be/EQ085DcVDrc> (Explanation on cutting channel, watch till 1.20 mins)
- ✓ Handout

**A. Competency/Competencies:**

- i. Lay water pipelines in any domestic plumbing installation.

**B. Learning objectives/Topic:**

Learning objectives	Topic
2.15.1 Explain types of pipe laying and importance of trial fitting	<p><b>2.15 Laying water pipeline</b></p> <p><b>Overview:</b> The learners can lay water pipeline besides knowing the importance, consequence and calculation of loading values and dimensions.</p>
2.15.2 Explain the importance of laying hot and cold-water pipeline in parallel	
2.15.3 Explain the consequences of the improper laying of pipe	
2.15.4 Calculate the loading values and dimensioning	
2.15.5 Lay water pipeline	

2.15.6 <i>Work in team</i>	
2.15.7 <i>Ensure appropriate use of hand gloves and apron</i>	

**C. Learning Experiences:**

- ✓ Brainstorm on the importance of laying water pipelines.
- ✓ Make learners read INFORMATION SHEET 2.15 and make students go through it.
- ✓ Demonstrate on OPERATION SHEET 2.15
- ✓ Provide guided practice
- ✓ Let them practice individually.
- ✓ Arrange site visit.
- ✓ Let the learners go through INFORMATION SHEET 2.15 and OPERATION SHEET 2.15
- ✓ Provide PPT on types of pipe laying and the importance of trial fittings. (need to prepare by self)
- ✓ Explain PPT through Camtasia( need to prepare by self)

**D. Assessment:**

- ✓ The teacher develops a rubric to assess learners while performing OPERATION SHEET 2.15
- ✓ Make learners solve the SAMPLE SELF CHECK 2.15
- ✓ Frame questions from CBLM and other resources-Google/YouTube.
- ✓ Ask learners to solve the SAMPLE SELF CHECK 2.6 and send answers through Google Classroom or any other social media platforms.
- ✓ Give additional questions from CBLM and other resources-Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms.
- ✓ Assess through oral/viva-voce
- ✓ Conduct written test through Kahoot.

**E. Resources:**

- ✓ CBLM of Classes IX and X, REC
- ✓ Handout.
- ✓ PPT

**A. Competency/Competencies:**

- i. Fix clamp to secure pipes as per requirement.



**B. Learning objectives/Topic:**

Learning objectives	Topic
2.16.1 Define clamp and dowel	<b>2.16 Fixing clamps</b>  <b>Overview:</b> The learners can fix the types of clamp and dowel besides knowing the purpose and the standard spacing between clamps.
2.16.2 List the types of clamp and dowel	
2.16.3 Explain the purpose of fixing the clamp	
2.16.4 State the standard spacing between clamps	
2.16.5 Fix clamp	
2.16.6 <i>Ensure proper handling of drilling machine</i>	
2.16.7 <i>Ensure economic use of materials</i>	
2.16.8 <i>Ensure appropriate use of hand gloves, ear plug and goggle</i>	

**C. Learning Experiences:**

- ✓ Make learners go through INFORMATION SHEET 2.16 and OPERATION SHEET 2.16
- ✓ Demonstrate based on OPERATION SHEET 2.16
- ✓ Provide guided practice followed by individually practice.
- ✓ Share the web link <https://youtu.be/quKV1iEypj0> which explains how to fix clamp.
- ✓ Provide handouts, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.
- ✓ Make learners go through OPERATION SHEET 2.16.
- ✓ Explain PPT through Audiovisual.

**D. Assessment:**

- ✓ Make learners read INFORMATION SHEET 2.16 and perform OPERATION SHEET 2.16.
- ✓ Assess learner's knowledge about the purpose of fixing clamp by asking questions.
- ✓ Make learners solve the SAMPLE SELF CHECK 2.16
- ✓ Assess the learner's ability through conducting oral tests.
- ✓ Make learners solve the SAMPLE SELF CHECK 2.16. Send the answers through Google Classroom or any other social media platforms.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ Competency-Based Learning Materials for Classes XI, REC
- ✓ Handout
- ✓ PPT
- ✓ <https://youtu.be/quKV1iEypj0> (fixing of clamp)

**A. Competency/Competencies:**

- i) Conduct leakage tests as per job requirements.

**B. Learning objectives/Topic:**

Learning objectives	Topic:
2.17.1 Explain the working principle of pressure testing equipment 2.17.1 State the types of pressure testing equipment 2.17.1 Explain the methods of checking leak test 2.17.1 State the importance of removing air from the test line 2.17.1 Conduct leakage test 2.17.1 <i>Ensure proper handling of pressure testing device</i> 2.17.1 <i>Ensure appropriate use of hand gloves</i>	<b>2.17 Conducting leak test</b>  <b>Overview:</b> The learners can conduct leak test by using types of pressure testing equipment, besides understanding the methods and importance of removing air from the test line.

**C. Learning Experiences:**

- ✓ Make the learners read INFORMATION SHEET 2.17 Provide handout to learners.
- ✓ Share the web link <https://youtu.be/M5pl2913bdc> which explains conducting leakage test.
- ✓ Demonstrate on OPERATION SHEET 2.17
- ✓ Make the learners perform OPERATION SHEET 2.17
- ✓ Provide guided practices followed by individual practices.
- ✓ Instruct learners to go through INFORMATION SHEET 2.17 and make learners go through OPERATION SHEET 2.1.
- ✓ Share the web link <https://youtu.be/M5pl2913bdc> which explains conducting leakage test.
- ✓ Let the learners discuss in a group and submit their responses through google classroom or any other relevant social media.
- ✓ Provide PPT on the methods of checking leak tests and the importance of removing air from the test line.

**D. Assessment:**

- ✓ Make learners go through INFORMATION SHEET 2.17 and OPERATION SHEET 2.17.
- ✓ Make learners perform OPERATION SHEET 2.17
- ✓ Make learners solve the SAMPLE SELF CHECK 2.17.
- ✓ Let the learners do a presentation on conducting leakage tests and assess as per the rubric developed.
- ✓ Assess the learner's ability through conducting oral tests or written tests.
- ✓ Make learners read INFORMATION SHEET 2.17 and OPERATION SHEET 2.17 and ask them to send the short video as evidence through Google Classroom or any other relevant social media platforms to assess them using a checklist/performance guide.
- ✓ Make learners solve the SAMPLE SELF CHECK 2.17. Send the answers through Google Classroom or any other social media platforms.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ CBLM
- ✓ <https://youtu.be/M5pl2913bdc> ( Explanation on conducting leakage)

**A. Competency/Competencies:**

- i. Insulate pipe as per weather conditions.

**B. Learning objectives/Topic:**

Learning objectives	Topic
2.18.1 Explain the types of pipe insulation 2.18.2 Explain the purpose of pipe insulation 2.18.3 List the types of pipe insulation materials 2.18.4 List the types of binding materials 2.18.5 Insulate pipe 2.18.6 <i>Ensure proper handling of insulating materials</i> 2.18.7 <i>Ensure proper disposal of waste product</i> 2.18.8 <i>Ensure appropriate use of hand gloves, goggles, and a dust mask</i>	<b>2.18 Insulating pipe</b> <b>Overview:</b> The learners can insulate the pipe with different types of pipe insulation, binding materials and also know the purpose of pipe insulation.

**C. Learning Experiences:**

- ✓ Make learners go through INFORMATION SHEET 2.18.
- ✓ Share the web link <https://youtu.be/XxbtlKW2-wU> for further explanation on the insulating pipe and make them write handouts out of it in their notebook.
- ✓ Demonstrate on OPERATION SHEET 2.18

- ✓ Make learners perform OPERATION SHEET 2.18.
- ✓ Provide guided practices
- ✓ Make learners go through INFORMATION SHEET 2.18 and OPERATION SHEET 2.18.
- ✓ Share web link <https://youtu.be/XxbtIKW2-wU> for further explanation on the insulating pipe and make them write handouts out of it in their notebook.
- ✓ Provide PPT on the methods of insulation and types of insulating materials

**D. Assessment:**

- ✓ Instruct learners to perform OPERATION SHEET 2.18 and assess them using a checklist/performance guide. Provide necessary intervention
- ✓ Make learners solve SAMPLE SELF CHECK 2.18 and give additional questions from CBLM and other resources.
- ✓ Assess the learner's ability through conducting oral OR written tests.
- ✓ Make learners solve the SAMPLE SELF CHECK 2.8. Send the answers through Google Classroom or any other social media platforms.
- ✓ Frame questions using different sources and let the learners submit answers through Google Classroom or any other social media platforms.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ CBLM
- ✓ Handout
- ✓ PPT
- ✓ <https://youtu.be/XxbtIKW2-wU>

## Chapter 3 : Installing water tanks and pumps

### A. Competency/Competencies:

- i. Interpret drawing of different storage tanks.

### B. Learning objectives/Topic:

Learning objectives	Topic
3.1.1 List the signs and symbols for the storage tank and its component 3.1.2 Label the different components of tank 3.1.3 Interpret tank drawing 3.1.4 Ensure safe handling of drawing	<b>3.1 Interpreting tank drawing</b>  <b>Overview:</b> The learners can interpret the tank drawing and list the signs and symbols of the water storage tank with its componets.

### C. Learning Experiences:

- ✓ Brainstorm on the signs and symbols storage tank
- ✓ Make learners read INFORMATION SHEET 3.1.
- ✓ Make learners go through OPERATION SHEET 3.1.
- ✓ Provide PPT on components of the storage tank
- ✓ Arrange site visit.
- ✓ Provide PPT on components of the storage tank (need to prepare by self)
- ✓ Explain PPT through Camtasia( need to prepare by self)

### D. Assessment:

- ✓ The teacher develops a rubric to assess learners while performing OPERATION SHEET 3.1
- ✓ Make learners solve the SAMPLE SELF CHECK 3.1
- ✓ Frame questions from CBLM and other resources-Google/YouTube
- ✓ Ask learners to solve the SAMPLE SELF CHECK 3.1 and send answers through Google Classroom or any other social media platforms.
- ✓ Give additional questions from CBLM and other resources-Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms.
- ✓ Assess through oral/viva-voce
- ✓ Conduct written test through Kahoot.

**E. Resources:**

- ✓ CBLM
- ✓ Handout.
- ✓ PPT

Learning objectives	Topic
3.2.1 Explain the importance of studying site location. 3.2.2 State the types of report writing. 3.2.3 Study site location. 3.2.4 <i>Exhibit honesty.</i> 3.2.5 <i>Work in team.</i>	<b>3.2 Studying site location</b>  <b>Overview:</b> The learners can study the site location besides knowing the types of report writing and its importance.

**A. Competency/Competencies:**

- i. Study site location to assess installation of any storage tank.

**B. Learning objectives/Topic:**

**C. Learning Experiences:**

- ✓ Make learners go through information 3.2
- ✓ Make learners go through OPERATION SHEET 3.2
- ✓ Provide PPT on report writing.
- ✓ Provide PPT on report writing.
- ✓ Explain PPT through Audiovisual.

**D. Assessment:**

- ✓ Make learners perform OPERATION SHEET 3.2
- ✓ Make learners solve the SAMPLE SELF CHECK 3.2
- ✓ Assess the learner's ability through conducting written/oral tests.
- ✓ Make learners solve the SAMPLE SELF CHECK 3.2 and send the answers through Google Classroom or any other social media platforms.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ Competency-Based Learning Materials
- ✓ PPT

**A. Competency/Competencies:**

- i. Prepare tank bedding as required to install water on the ground/source.

**B. Learning objectives/Topic:**

Learning objectives	Topic
3.3.1 Define bedding. 3.3.2 Explain the types of bedding. 3.3.3 Explain the purpose of tank bedding. 3.3.4 Prepare tank bedding. 3.3.5 <i>Work in a team.</i> 3.3.6 <i>Ensure proper handling of tools and materials.</i> 3.3.7 <i>Ensure appropriate use of hand gloves and an apron.</i>	<b>3.3 Preparing tank bedding</b> <b>Overview:</b> The learners can prepare the tank bedding besides knowing the types and purpose of the tank bedding.

**C. Learning Experiences:**

- ✓ Make the learners read INFORMATION SHEET 3.3
- ✓ Make the learners perform OPERATION SHEET 3.3
- ✓ Share the web link <https://youtu.be/IUhElusVM2Y> which explaining on the preparation of tank bedding.
- ✓ Demonstrate on OPERATION SHEET 3.3
- ✓ Provide guided practices
- ✓ Let them practices individually.
- ✓ Share the web link <https://youtu.be/IUhElusVM2Y> other resources such as video clips, handouts, etc through Google Classroom or any other social media platforms.
- ✓ Provide PPT on the purpose of tank bedding.

**D. Assessment:**

- ✓ As soon as the learners are aware of tank bedding, ask them to perform OPERATION SHEET 3.3 and keep on practicing while performing any task.
- ✓ Make learners solve the SAMPLE SELF CHECK 3.3
- ✓ Assess the learner's ability through conducting oral tests or written tests.
- ✓ Make learners solve the SAMPLE SELF CHECK 3.3 and send the answers through Google Classroom or any other social media platforms.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ CBLM
- ✓ <https://youtu.be/IUhElusVM2Y> ( Preparation on tank bedding)
- ✓ PPT

**A. Competency/Competencies:**

- i. Fix tank component as per the given drawing/ requirement.

**B. Learning objectives/Topic:**

Learning objectives	Topic
3.4.1 Define storage tank. 3.4.2 List the components of the storage tank and their functions. 3.4.3 Explain the working principle of the float valve. 3.4.4 List the types of storage tank capacity. 3.4.5 Explain the types of the storage tank. 3.4.6 State the advantages and disadvantages of the storage tank. 3.4.7 Fix tank components. 3.4.8 <i>Ensure proper handling of drilling machine, pipe wrench, adjustable, and screwdriver.</i> 3.4.9 <i>Ensure economic use of materials.</i> 3.4.10 <i>Ensure appropriate use of hand gloves and helmet</i>	<b>3.4 Fixing tank components</b>  <b>Overview:</b> The learners can fix tank components, know their functions, the working principle of float valve besides knowing the types of storage tank and its advantages and disadvantages.

**C. Learning Experiences:**

- ✓ Make learners go through INFORMATION SHEET 3.4
- ✓ Demonstrate on OPERATION SHEET 3.4
- ✓ Make learners perform OPERATION SHEET 3.4
- ✓ Provide guided practices
- ✓ Provide PPT on components of the tank and their function.
- ✓ Provide handouts, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.

**D. Assessment:**

- ✓ As soon as the learners are aware of the fixing component of the tank, ask them to perform OPERATION SHEET 3.4 and keep on practicing while performing any task.
- ✓ Make learners solve SAMPLE SELF CHECK 3.4 and give additional questions from CBLM and other resources.
- ✓ Assess the learner's ability through conducting oral OR written tests.
- ✓ Ask learners to solve the SAMPLE SELF CHECK 3.4 and send the answers through Google Classroom or any other social media platforms.
- ✓ Frame questions using different sources and let the learners submit answers through Google Classroom or any other social media platforms.



- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ CBLM
- ✓ PPT

**A. Competency/Competencies:**

- i. Mount storage tank as per standard

**B. Learning objectives/Topic:**

Learning objectives	Topic
3.5.1 List the types of valve and their application. 3.5.2 Explain the function of the union. 3.5.3 Explain the purpose of using vent pipe. 3.5.4 Explain the importance of checking leakage. 3.5.5 Explain the importance of checking the flow direction of the gate valve. 3.5.6 Mount storage tank. 3.5.7 <i>Ensure proper handling of the storage tank.</i> 3.5.8 <i>Ensure appropriate use of helmet, hand glove, apron, and safety belt.</i>	<b>3.5 Mounting storage tank</b>  <b>Overview:</b> The learners can mount the storage tank besides knowing the types of valve and their application, function of the union and vent pipe and checking the flow direction of gate valve.

**C. Learning Experiences:**

- ✓ Make learners read INFORMATION SHEET 3.5
- ✓ Make learners go through INFORMATION SHEET 3.5
- ✓ Provide PPT on types of valve and their application.
- ✓ Make learners go through OPERATION SHEET 3.5
- ✓ Demonstrate on OPERATION SHEET 3.5
- ✓ Provide guided practice on OPERATION SHEET 3.5
- ✓ Make learners go through INFORMATION SHEET 3.5 and OPERATION SHEET 4.5 through Google Classroom.
- ✓ Provide PPT on types of valve and their application through Audiovisual

**D. Assessment:**

- ✓ Make learners solve SAMPLE SELF CHECK 3.5 and give additional questions from CBLM.
- ✓ Conduct a test (quiz, true or false, puzzle or short answer type questions) through Kahoot.

- ✓ Make learners solve SAMPLE SELF CHECK 3.5 and give additional questions from CBLM and instruct them to send their works through Google Classroom or any other resources.
- ✓ Conduct a test (quiz, true or false, puzzle or short answer type questions) using Kahoot through Google Classroom.

**E. Resources:**

- ✓ CBLM
- ✓ PPT

## Chapter 4 : Installing water pumps

### A. Competency/Competencies:

- i. Interpret any pump drawing to perform the layout of the pump.

### B. Learning objectives/Topic:

Learning objectives	Topic
4.1.1 Explain the types of signs and symbols. 4.1.2 Explain the importance of referring to the drawing. 4.1.3 <i>Ensure good housekeeping practices.</i> 4.1.4 <i>Ensure correct interpretation of the drawing.</i> 4.1.5 <i>Ensure safe handling of drawing.</i>	<b>4.1 Interpreting pump drawing</b>  <b>Overview:</b> The learners can interpret the pump drawing besides knowing the types of signs and symbols and the importance of referring the drawing.

### C. Learning Experiences:

- ✓ Make learners read signs and symbols of water pump
- ✓ Make learners go through the INFORMATION SHEET 4.1
- ✓ Share the web link <https://youtu.be/4iWR7IS3QZY> which explains parts of the pump.
- ✓ Make learners go through OPERATION SHEET 4.1.
- ✓ Demonstrate on OPERATION SHEET 4.1
- ✓ Provide guided practice on OPERATION SHEET 4.1
- ✓ Make learners go through the INFORMATION SHEET 4.1 of CBLM through Google Classroom.
- ✓ Provide PPT on signs and symbols of water pump through audiovisual.
- ✓ Share the web link <https://youtu.be/4iWR7IS3QZY> which explains parts of the water pump through Google Classroom.
- ✓ Make learners go through OPERATION SHEET 4.1

### D. Assessment:

- ✓ Make learners perform OPERATION SHEET 4.1 and keep on practicing while performing any task.
- ✓ Make learners answer the SAMPLE SELF CHECK 4.1 with additional questions.
- ✓ Assess learners' performance using a rubric.
- ✓ Make learners answer the SAMPLE SELF CHECK 4.1 with additional questions and send it through Google Classroom.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ CBLM
- ✓ <https://youtu.be/4iWR7IS3QZY> (Explaining parts of pumps)

**A. Competency/Competencies:**

- i. Prepare pump layout using 3,4,5, method.

**B. Learning objectives/Topic:**

Learning objectives	Topic
4.2.1 Explain the Pythagoras theorem. 4.2.2 Explain the method of layout. 4.2.3 Prepare pump layout 4.2.4 <i>Ensure proper handling of tools and material.</i> 4.2.5 <i>Ensure appropriate use of hand gloves.</i>	<b>4.2 Preparing pump layout</b>  <b>Overview:</b> The learners can prepare pump layout besides knowing the method of layout by using the Pythagoras thorem.

**C. Learning Experiences:**

- ✓ Lecture on Pythagoras theorem.
- ✓ Make learners go through INFORMATION SHEET 4.2.
- ✓ Provide PPT on the method of layout
- ✓ Demonstrate on the OPERATION SHEET 4.2.
- ✓ Provide guided Practices.
- ✓ Let them practices individually.
- ✓ Provide PPT on the method of layout through google classroom.

**D. Assessment:**

- ✓ Make learners perform OPERATION SHEET 4.2 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Make learners solve the SAMPLE SELF CHECK 4.2
- ✓ Assess the learner's ability through conducting oral tests/ written tests.
- ✓ Make learners solve the SAMPLE SELF CHECK 4.2 and send it through Google Classroom.
- ✓ Frame questions using different sources and let the learners submit answers through Google Classroom or any other social media platforms.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ CBLM
- ✓ PPT

**A. Competency/Competencies:**

- i. Construct pump base for installation of any pump.

**B. Learning objectives/Topic:**

Learning objectives	Topic
4.3.1 Explain different types of foundations. 4.3.2 State the purpose of soling. 4.3.3 State the difference between PCC and RCC. 4.3.4 Explain the application Bhutan schedule of Rate (BSR) and Bill of Quantities. (BOQ) 4.3.5 Perform stone soiling. 4.3.6 Perform concreting. 4.3.7 <i>Proper handling of tools and equipment.</i> 4.3.8 <i>Ensure appropriate use of BSR and BOQ.</i> 4.3.9 <i>Ensure appropriate use of hand gloves, a helmet, and an apron.</i>	<b>4.3 Constructing pump base</b>  <b>Overview:</b> The learners can construct the pump base besides knowing the types of foundation and soling, and also acquire some basic skills of masonry.

**C. Learning Experiences:**

- ✓ Make learners go through the INFORMATION SHEET 4.3.
- ✓ Provide handout on the difference between PCC and RCC
- ✓ Let the learners discuss in a group and do a presentation on the purpose of soiling using PPT, handouts.
- ✓ Make learners go through the OPERATION SHEET 4.3
- ✓ Demonstrate OPERATION SHEET 4.3 through guided practices.
- ✓ Arrange site visit.
- ✓ Provide handout on the difference between PCC and RCC
- ✓ Provide handouts on the purpose of soiling, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.
- ✓ Make learners go through SKILL SHEET 4.3
- ✓ Make learners go through OPERATION SHEET 4.3

**D. Assessment:**

- ✓ Make learners read INFORMATION SHEET 4.3 and perform OPERATION SHEET 4.3 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Assess learner's knowledge about the application of BSR and BOQ by asking questions.
- ✓ Conduct class tests to assess their understanding.
- ✓ Let learners carry out activities of the SAMPLE SELF CHECK 4.3
- ✓ Let the learners do a presentation and assess as per the rubric developed.

- ✓ Make learners read INFORMATION SHEET 4.3 and perform OPERATION SHEET 4.3 and ask them to send the short video as evidence through Google Classroom or any other relevant social media platforms. Assess them using a checklist/performance guide.
- ✓ Let the student solve SAMPLE SELF CHECK 4.3 and submit answers through google classroom or any other relevant social media.
- ✓ Give additional relevant questions from other resources-Text books/Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms. Use the rubric to assess their answer.

**E. Resources:**

- ✓ CBLM
- ✓ PPT
- ✓ Handouts

**A. Competency/Competencies:**

- i. Assemble a pump component that can deliver water to the required height.

**B. Learning objectives/Topic:**

Learning objectives	Topic
4.4.1 Define water pump. 4.4.2 List the types of the water pump and their specifications. 4.4.3 Explain the function of the water pump. 4.4.4 Level the parts of the water pump. 4.4.5 State the working principle of the water pump. 4.4.6 List the advantages and disadvantages of pumps. 4.4.7 Explain the purpose of using a check/foot valve. 4.4.8 <i>Ensure proper handling of tools and equipment.</i> 4.4.9 <i>Ensure appropriate use of hand gloves, helmet, and safety belt</i>	<b>4.4 Assembling pump accessories</b>  <b>Overview:</b> The learners can assemble pump accessories, besides knowing the types and their specifications, function and the working principle of the water pump.

**C. Learning Experiences:**

- ✓ Brainstorm of accessories of the pump
- ✓ Make learners read INFORMATION SHEET 4.4
- ✓ Provide handouts to learners.
- ✓ Make learners perform OPERATION SHEET 4.4

- ✓ Let the learners discuss in a group and do a presentation on the function of water pumps using PPT, handouts, demonstration, and short video clips to explain the function of the water pump.
- ✓ Arrange site visit.
- ✓ Instruct learners to read INFORMATION SHEET 4.4 through Google Classroom.
- ✓ Share the web link <https://youtu.be/DmJC DOT IDRY> which explains the parts of the water pump and the working principle of water pumps.
- ✓ Share the web link <https://youtu.be/wsm5zszsBI4s> which explains the types of pumps
- ✓ Provide handouts, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.
- ✓ Instruct learners to go through OPERATION SHEET 4.4 through Google Classroom.

**D. Assessment:**

- ✓ Make learners read INFORMATION SHEET 4.4 and perform OPERATION SHEET 4.4 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Assess learner's knowledge about types of the water pump and their specification by asking questions.
- ✓ Conduct class tests to assess their understanding.
- ✓ Let learners carry out activities of the SAMPLE SELF CHECK 4.4
- ✓ Let the learners do the presentation and assess as per the rubric developed
- ✓ Make learners read INFORMATION SHEET 4.4 and ask them to send the short video as evidence through Google Classroom or any other relevant social media platforms. Assess them using a checklist/performance guide.
- ✓ Let the student solve SAMPLE SELF CHECK 4.4 and submit the answer through google classroom or any other relevant social media.
- ✓ Give additional relevant questions from other resources-Text books/Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms. Use the rubric to assess their answer.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ CBLM
- ✓ PPT
- ✓ <https://youtu.be/DmJC DOT IDRY> (Explanation on parts of the pump and working principle)
- ✓ <https://youtu.be/wsm5zszsBI4s> (Explanation on types of pumps)

- A. Competency/Competencies:**
- i. Test pump to detect any leakage.

**B. Learning objectives/Topic:**

Learning objectives	Topic
4.5.1 Explain the importance of priming. 4.5.2 Explain do's and don'ts for installing the pump. 4.5.3 Calculate head discharge. 4.5.4 State the causes of the problem in the water pump. 4.5.5 Prime the pump. 4.5.6 <i>Ensure proper handling of tools and equipment.</i>	<b>4.5 Testing pump</b>  <b>Overview:</b> The learners can test the water pump beside knowing the importance of priming, dos and don'ts for installing the pump and to calculate the head discharge.

**C. Learning Experiences:**

- ✓ Lecture on dos and don'ts for installing the pump.
- ✓ Make learners read INFORMATION SHEET 4.5
- ✓ Provide handouts to learners.
- ✓ Make learners perform OPERATION SHEET 4.5
- ✓ Let the learners discuss in a group and do a presentation on head discharge using PPT, handouts, demonstration, and short video clips to explain the function of the water pump.
- ✓ Instruct learners to read INFORMATION SHEET 4.5 through Google Classroom.
- ✓ Share the web link <https://youtu.be/sOMI1N8ZiFo> which explains how to calculate discharge.
- ✓ Provide handouts, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.
- ✓ Instruct learners to go through OPERATION SHEET 4.5 through Google Classroom.

**D. Assessment:**

- ✓ Make learners read INFORMATION SHEET 4.5 and perform OPERATION SHEET 4.5 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Assess learner's knowledge about the calculation of head discharge by asking questions.
- ✓ Conduct class tests to assess their understanding.
- ✓ Let learners carry out activities of the SAMPLE SELF CHECK 4.5
- ✓ Let the learners do the presentation and assess as per the rubric developed
- ✓ Let the student solve SAMPLE SELF CHECK 4.5 and submit the answer through google classroom or any other relevant social media.



- ✓ Give additional relevant questions from other resources-Text books/Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms. Use the rubric to assess their answer.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ CBLM
- ✓ PPT
- ✓ Handout
- ✓ <https://youtu.be/sOMI1N8ZiFo> ( Calculation of head discharge)

## ENGINEERING DRAWING

**A. Competency/Competencies:**

- i. Draw orthographic projections to give an accurate overall representation of an object.

**B. Learning objectives/Topic:**

Learning objectives	Topic
2.3.1 Define orthographic drawing. 2.3.2 List the four quadrants. 2.3.3 Name the different ways of drawing orthographic projections. 2.3.4 Differentiate between first and third angle projection. 2.3.5 Draw orthographic projection. 2.3.6 <i>Ensure proper handling of drawing instruments.</i> 2.3.7 <i>Ensure proper disposal of waste.</i>	<b>2.3 Drawing orthographic projection</b>  <b>Overview:</b> The learners can draw orthographic projection with the four quadrants besides knowing different ways of drawing orthographic projections.

**C. Learning Experiences:**

- ✓ Make learners read INFORMATION SHEET 2.3
- ✓ Make learners read and perform OPERATION SHEET 2.3.
- ✓ Make learners solve the SAMPLE SELF CHECK 2.3 and provide additional questions on drawing an orthographic projection.
- ✓ Instruct learners to read INFORMATION SHEET 2.3 through Google Classroom.
- ✓ Share the web links <https://youtu.be/Gees6d2ANzs> and <https://youtu.be/sC8-ivJpBaA> explains the details of differences between the first angle and third angle projection
- ✓ Instruct learners to read and perform OPERATION SHEET 2.3 in A4 size paper and submit it through Google Classroom.
- ✓ Provide additional questions to draw orthographic projection along with letting learners solve SAMPLE SELF CHECK 2.3 and submit their work through Google Classroom.

**D. Assessment:**

- ✓ Assess learners' ability to perform OPERATION SHEET 2.3n drawing an orthographic projection using a rubric.
- ✓ Assess learners' response to SAMPLE SELF CHECK 2.3 and the additional questions provided.
- ✓ Provide feedback.

- ✓ Assess learners' response to SAMPLE SELF CHECK 2.3 and the additional questions provided.
- ✓ Provide feedback through Google Classroom.

**E. Resources:**

- ✓ CBLM
- ✓ <https://youtu.be/1sjaelzuGAK> (Basics of orthographic projection)
- ✓ <https://youtu.be/Gees6d2ANzs> / <https://youtu.be/sC8-lvJpBaA> (Difference between the first angle and third angle projection)

**A. Competency/Competencies:**

- i. Draw a building plan for a different design.

**B. Learning objectives/Topic:**

Learning objectives	Topic
2.4.1 Define building drawing. 2.4.2 List the types of building drawing. 2.4.3 Define the scale for drawing. 2.4.4 List the types of scale. 2.4.5 Draw a simple building plan. 2.4.6 Develop creativity through their simple drawing plan. 2.4.7 <i>Ensure proper handling of drawing instruments.</i> 2.4.8 <i>Ensure proper disposal of waste.</i>	<p><b>2.4 Drawing a simple building plan</b></p> <p><b>Overview:</b> The learners can draw a simple building plan besides knowing the types of building drawing and the types of scale.</p>

**C. Learning Experiences:**

- ✓ Make learners read INFORMATION SHEET 2.4.
- ✓ Make learners read and perform OPERATION SHEET 2.4.
- ✓ Make learners solve the SAMPLE SELF CHECK 2.4.
- ✓ Make learners design a simple drawing plan through their creativity.
- ✓ Instruct learners to read INFORMATION SHEET 2.4 through Google Classroom.
- ✓ Share the web link <https://youtu.be/VYiVjVulnm4> that shows how to draw a floor plan.
- ✓ Instruct learners to read and perform OPERATION SHEET 2.4 in A4 size paper and submit it through Google Classroom.
- ✓ Instruct learners to solve the SAMPLE SELF CHECK 2.4 and submit it through Google Classroom.
- ✓ Make learners design a simple drawing plan through their creativity.

**D. Assessment:**

- ✓ Assess learners' ability to perform OPERATION SHEET 2.4 on providing dimension to drawing using a rubric.
- ✓ Assess learners' response to SAMPLE SELF CHECK 2.4.
- ✓ Assess learners' creativity in designing a simple drawing plan.
- ✓ Provide feedback.
- ✓ Assess learners' response to SAMPLE SELF CHECK 2.4.
- ✓ Assess learners' creativity in designing a simple drawing plan.
- ✓ Provide feedback through Google Classroom.

**E. Resources:**

- ✓ CBLM
- ✓ <https://youtu.be/VYiViVulnm4> (How to draw a floor plan)

## Class XII

### Chapter 4 : Maintaining pipes and fittings

#### A. Competency/Competencies:

- i. Locate fault in pipeline as per the job requirement.

#### B. Learning objectives/Topic:

Learning objectives	Topic
4.1.1 Explain the causes and remedies of pipeline faults. 4.1.2 List the different types of fault. 4.1.3 <i>Exhibit honesty.</i> 4.1.4 <i>Work in a team.</i> 4.1.5 <i>Ensure appropriate use of hand gloves, helmet, apron, and safety belt.</i>	<b>4.1 Locating fault</b>  <b>Overview:</b> The learners will understand about the types of fault, its causes and remedies of pipeline faults besides being able to locate the fault.

#### C. Learning Experiences:

- ✓ Make learners read INFORMATION SHEET 6.1.
- ✓ Provide PPT on the causes and remedies of pipeline faults.
- ✓ Demonstrate on OPERATION SHEET 6.1
- ✓ Make learners read and perform OPERATION SHEET 6.1 through guided practice.
- ✓ Arrange site visit.
- ✓ Instruct learners to read INFORMATION SHEET 6.1 through Google Classroom.
- ✓ Provide handouts, self-made tutorial video clips, and PPT on the causes and remedies of pipeline faults through Google Classroom or any other relevant social media.
- ✓ Instruct learners to go through OPERATION SHEET 6.1 through Google Classroom.

#### D. Assessment:

- ✓ Make learners read INFORMATION SHEET 6.1 and perform OPERATION SHEET 6.1 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Assess learner's knowledge about causes and remedies of pipeline fault by asking questions.
- ✓ Conduct class tests to assess their understanding.
- ✓ Let learners carry out activities of the SAMPLE SELF CHECK 6.1
- ✓ Let the learners do the presentation and assess as per the rubric developed

- ✓ Let the student solve SAMPLE SELF CHECK 6.1 and submit the answer through google classroom or any other relevant social media.
- ✓ Give additional relevant questions from other resources-Text books/Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms. Use the rubric to assess their answer.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ CBLM
- ✓ Handout
- ✓ PPT

**A. Competency/Competencies:**

- i. Clear pipe blockage as per the requirement.

**B. Learning objectives/Topic:**

Learning objectives	Topic
4.2.1 Explain the causes of pipe blockage. 4.2.2 List the types of cleaning tools. 4.2.3 <i>Ensure proper handling tools, materials, and equipment</i> 4.2.4 <i>Ensure appropriate use of hand gloves, apron, and helmet</i>	<b>4.2 Clearing pipe blockage</b>  <b>Overview:</b> The topic is about the causes of pipe blockage, the types of cleaning tools and it enables the learners to clear pipe blockage.

**C. Learning Experiences:**

- ✓ Make learners go through the INFORMATION SHEET 6.3
- ✓ Let the learners discuss in a group and do a presentation on the type of cleaning tools using PPT, handouts.
- ✓ Make learners go through the OPERATION SHEET 6.3
- ✓ Demonstrate OPERATION SHEET 6.3 through guided practices.
- ✓ Make learners go through the INFORMATION SHEET 6.3
- ✓ Provide handouts on types of cleaning tools and causes of pipe blockage, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.
- ✓ Make learners go through SKILL SHEET 6.3
- ✓ Make learners go through OPERATION SHEET 6.3

**D. Assessment:**

- ✓ Make learners read INFORMATION SHEET 6.3 and perform OPERATION SHEET 6.3 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Assess learner’s knowledge about types of cleaning tools and causes of pipe blockage by asking questions.
- ✓ Conduct class tests to assess their understanding.
- ✓ Let learners carry out activities of the SAMPLE SELF CHECK 6.3
- ✓ Let the learners do the presentation and assess as per the rubric developed.
- ✓ Let the student solve SAMPLE SELF CHECK 6.3 and submit answers through google classroom or any other relevant social media.
- ✓ Give additional relevant questions from other resources-Text books/Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms. Use the rubric to assess their answer.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ CBLM
- ✓ PPT
- ✓ Handouts

**A. Competency/Competencies:**

- i. Repair defective pipe and fittings as required.

**B. Learning objectives/Topic:**

Learning objectives	Topic
4.3.1 Explain the causes and remedies of defective pipelines 4.3.2 Explain the causes and remedies of defectives fittings 4.3.3 <i>Ensure proper handling tools, materials, and equipment</i> 4.3.4 <i>Ensure appropriate use of hand gloves, apron, and helmet</i>	<b>4.3 Repairing defective pipes and fitting</b>  <b>Overview:</b> The topic is about the causes and remedies of defective pipelines and fittings. It can enable the learners to repair defective pipes and fittings perfectly.

**C. Learning Experiences:**

- ✓ Make learners go through the INFORMATION SHEET 6.4.
- ✓ Let the learners discuss in a group and do a presentation on causes of defective pipelines and fittings using PPT, handouts.
- ✓ Make learners go through the OPERATION SHEET 6.4
- ✓ Demonstrate OPERATION SHEET 6.4 through guided practices.
- ✓ Arrange site visit.
- ✓ Make learners go through the INFORMATION SHEET 6.4
- ✓ Provide handouts on the purpose of soiling, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.
- ✓ Share the web link [https://youtu.be/uEpAcBu- 7w](https://youtu.be/uEpAcBu-7w) which explains on repairing crake of the CPVC pipe.
- ✓ Make learners go through SKILL SHEET 6.4
- ✓ Make learners go through OPERATION SHEET 6.4

**D. Assessment:**

- ✓ Make learners read INFORMATION SHEET 6.4 and perform OPERATION SHEET 6.4 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Assess learner's knowledge about causes of defective pipelines and fittings by asking questions.
- ✓ Conduct class tests to assess their understanding.
- ✓ Let learners carry out activities of the SAMPLE SELF CHECK 6.4
- ✓ Let the learners do the presentation and assess as per the rubric developed.
- ✓ Let the student solve SAMPLE SELF CHECK 5.3 and submit answers through google classroom or any other relevant social media.
- ✓ Give additional relevant questions from other resources-Text books/Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms. Use the rubric to assess their answer.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ CBLM
- ✓ PPT
- ✓ Handouts
- ✓ [https://youtu.be/uEpAcBu- 7w](https://youtu.be/uEpAcBu-7w) ( Explanation on crack repairing)



## Chapter 5 : Install sanitary fixtures and fittings.

**A. Competency/Competencies:**

- i. Identify sanitary fixtures/appliances as per the requirement.

**B. Learning objectives/Topic:**

Learning objectives	Topic
5.1.1 Define sanitary fixture 5.1.2 List the types of sanitary fixtures and their uses 5.1.3 State the importance of checking defects 5.1.4 <i>Ensure proper handling of materials</i>	<b>5.1 Identifying sanitary fixtures/appliances</b>  <b>Overview:</b> The learners can identify the types of sanitary fixtures and their uses.

**C. Learning Experiences:**

- ✓ Brainstorm on the importance of identifying sanitary fixtures and its appliances.
- ✓ Make students read INFORMATION SHEET 5.1.
- ✓ Share the link <https://www.youtube.com/watch?v=kPHTaUaB93s> which explains on types of wash basin.
- ✓ Arrange site visit.
- ✓ Share the link <https://www.youtube.com/watch?v=kPHTaUaB93s> which explains types of wash basin through other resources such as video clips, handouts, etc through Google Classroom or any other social media platforms.
- ✓ Provide handouts to learners through Google Classroom or any other social media platforms.
- ✓ The learners should study INFORMATION SHEET 5.1 and OPERATION SHEET 5.1.

**D. Assessment:**

- ✓ Make learners read INFORMATION SHEET 5.1 and perform OPERATION SHEET 5.1 and assess them using a checklist/performance guide.
- ✓ Let learners carry out activities of the SAMPLE SELF CHECK 5.1.1
- ✓ Give additional questions from CBLM.
- ✓ Assess the learner's ability through conducting oral OR written tests.
- ✓ Make learners solve the SAMPLE SELF CHECK 5.1 that fulfills objectives and send answers through Google Classroom or any other social media platforms.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ Competency-Based Learning Materials
- ✓ Handouts
- ✓ PPT
- ✓ <https://www.youtube.com/watch?v=kPHTaUaB93s>

**A. Competency/Competencies:**

- i. Prepare layout as per the drawing using standard dimensions.

**B. Learning objectives/Topic:**

Learning objectives	Topic
5.2.1 List the signs and symbols of sanitary fixtures 5.2.2 List the standard dimensions of sanitary fixtures 5.2.3 State the appropriate location of sanitary fixtures 5.2.4 Explain the importance of technical drawing 5.2.5 <b>Use laser level</b> 5.2.6 <i>Ensure safe handling of tools and equipment</i> <i>Ensure to use PPE</i>	<b>5.2 Preparing layout</b>  <b>Overview:</b> The topic is about signs and symbols, standard dimensions, importance of technical drawing and can use laser level correctly.

**C. Learning Experiences:**

- ✓ Demonstrate on OPERATION SHEET 5.2 .
- ✓ Make the learners perform OPERATION SHEET 5.2
- ✓ Share the web link <https://www.youtube.com/watch?v=qBmV-QFPfJg> which explaining on how to use laser level.
- ✓ Make learners go through INFORMATION SHEET 3.10 and OPERATION SHEET 5.2.
- ✓ Provide PPT on types of re-bar and purpose of reinforcement.

**D. Assessment:**

- ✓ Make learners solve the SAMPLE SELF CHECK 2.14 that fulfills objectives and competency.
- ✓ Frame questions from CBLM and other resources-Google/YouTube.
- ✓ Assess the learners' ability to cut channels by preparing a rubric.
- ✓ Make learners solve the SAMPLE SELF CHECK 2.14 that fulfills objectives and competency send answers through Google Classroom or any other social media platforms.

- ✓ Give additional questions from CBLM and other resources-Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ Competency-Based Learning Materials
- ✓ <https://www.youtube.com/watch?v=qBmV-QFPfJg> (How to use laser level)

**A. Competency/Competencies:**

- i. Install wash basin as per the standard practices.

**B. Learning objectives/Topic:**

Learning objectives	Topic
5.3.1 Define wash basin 5.3.2 Explain different types of wash basin 5.3.3 List the components of wash basin 5.3.4 <b>Fix basin mixer</b> 5.3.5 <i>Ensure safe handling of tools and materials</i> 5.3.6 <i>Ensure to use PPE</i>	<b>5.2 Installing wash basin</b>  <b>Overview:</b> The topic covered are the different types of washbasin, component of washbasin and its enables the learners to install washbasin as per standard.

**C. Learning Experiences:**

- ✓ Brainstorm on the installing wash basin.
- ✓ Make students read INFORMATION SHEET 5.3
- ✓ Make learners go through OPERATION SHEET 5.3.
- ✓ Provide PPT on installing wash basin.
- ✓ Arrange site visit.
- ✓ Let the learners go through INFORMATION SHEET 5.3 and OPERATION SHEET 5.3
- ✓ Explain PPT through Camtasia( need to prepare by self)

**D. Assessment:**

- ✓ The teacher develops a rubric to assess learners while performing OPERATION SHEET 5.3
- ✓ Make learners solve the SAMPLE SELF CHECK 5.3
- ✓ Frame questions from CBLM and other resources-Google/YouTube.
- ✓ Ask learners to solve the SAMPLE SELF CHECK 5.3 and send answers through Google Classroom or any other social media platforms.

- ✓ Give additional questions from CBLM and other resources-Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms.
- ✓ Assess through oral/viva-voce
- ✓ Conduct written test through Kahoot.

**E. Resources:**

- ✓ CBLM
- ✓ Handout.
- ✓ PPT

**A. Competency/Competencies:**

- i. Install European Water Closet (EWC) pan as per the standard practices.

**B. Learning objectives/Topic:**

Learning objectives	Topic
5.4.1 Define EWC pan 5.4.2 Explain types of EWC pan 5.4.3 State advantages and disadvantages of using EWC pan 5.4.4 Define trap 5.4.5 List the types of traps and their uses 5.4.6 <i>Ensure safe handling of tools and materials</i> 5.4.7 <i>Ensure to use PPE</i>	<p><b>5.3 Installing European Water Closet (EWC) pan</b></p> <p><b>Overview:</b> The topic covered are types of EWC pan, advantages and disadvantages of using EWC pan and the type of trap and their uses.</p>

**C. Learning Experiences:**

- ✓ Make learners go through INFORMATION SHEET 5.4
- ✓ Make learners go through OPERATION SHEET 5.4
- ✓ Provide PPT on installing EWC pan
- ✓ Explain PPT through Audiovisual.

**D. Assessment:**

- ✓ Make learners perform OPERATION SHEET 5.4
- ✓ Make learners solve the SAMPLE SELF CHECK 5.4
- ✓ Assess the learner's ability through conducting written/oral tests.
- ✓ Make learners solve the SAMPLE SELF CHECK 5.4 and send the answers through Google Classroom or any other social media platforms.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

- E. Resources:**
- ✓ Competency-Based Learning Materials
  - ✓ PPT

- A. Competency/Competencies:**
- i. Install cistern as per the standard practices.

**B. Learning objectives/Topic:**

Learning objectives	Topic
5.5.1 Define cistern 5.5.2 Explain the types of cisterns 5.5.3 State the differences between manual and automatic flushing cistern 5.5.4 Label the parts of cistern and explain it's working principle 5.5.5 <i>Ensure safe handling of tools and materials</i> 5.5.6 <i>Ensure to use PPE</i>	<b>5.4 Fixing cistern</b>  <b>Overview:</b> The topic is about types of cisterns, difference between manual and automatic flushing cistern and the working principle of cisterns.

- C. Learning Experiences:**
- ✓ Make the learners read INFORMATION SHEET 5.5
  - ✓ Make the learners perform OPERATION SHEET 5.5
  - ✓ Share the web link <https://www.youtube.com/watch?v=K7mawfh27Lw> which explain on the fix cistern.
  - ✓ Demonstrate on OPERATION SHEET 5.5
  - ✓ Provide guided practices
  - ✓ Make learners go through INFORMATION SHEET 5.5
  - ✓ Make learners go through OPERATION SHEET 5.5
  - ✓ Share the web link <https://www.youtube.com/watch?v=K7mawfh27Lw> other resources such as video clips, handouts, etc through Google Classroom or any other social media platforms.

- D. Assessment:**
- ✓ As soon as the learners are aware of tank bedding, ask them to perform OPERATION SHEET 4.3 and keep on practicing while performing any task.
  - ✓ Make learners solve the SAMPLE SELF CHECK 5.5
  - ✓ Assess the learner's ability through conducting oral tests or written tests.
  - ✓ Make learners solve the SAMPLE SELF CHECK 5.5 and send the answers through Google Classroom or any other social media platforms.
  - ✓ Written test through Kahoot.
  - ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ CBLM
- ✓ PPT
- ✓ <https://www.youtube.com/watch?v=K7mawfh27Lw> ( to fix cistern)

**A. Competency/Competencies:**

- i. Install Asian Water Closet (AWC) pan as per the standard practices.

**B. Learning objectives/Topic:**

Learning objectives	Topic
5.6.1 List the types of AWC pan 5.6.2 Explain the importance of providing bedding 5.6.3 State the purpose of applying mortar/adhesive around the joints 5.6.4 State the advantages and disadvantages of AWC pan 5.6.5 <b>Construct brick wall</b> 5.6.6 <i>Ensure safe handling of tools and materials</i> 5.6.7 <i>Ensure to use PPE</i>	<b>5.5 Installing Asian Water Closet (AWC) pan</b>  <b>Overview:</b> The topic is about types of AWC pan, importance of providing bedding, purpose of applying mortar around the joints and advantages and disadvantages of AWC pan. Ther learner can install AWC pan.

**C. Learning Experiences:**

- ✓ Make learners go through INFORMATION SHEET 5.6
- ✓ Demonstrate on OPERATION SHEET 5.6
- ✓ Make learners perform OPERATION SHEET 5.6
- ✓ Provide guided practices
- ✓ Make learners go through INFORMATION SHEET 5.6 and OPERATION SHEET 5.6
- ✓ Provide PPT on installing Asian Water Closet pan.
- ✓ Provide handouts, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.

**D. Assessment:**

- ✓ As soon as the learners are aware of the installing AWC pan, ask them to perform OPERATION SHEET 5.6 and keep on practicing while performing any task.
- ✓ Make learners solve SAMPLE SELF CHECK 5.6 and give additional questions from CBLM and other resources.
- ✓ Assess the learner's ability through conducting oral OR written tests.
- ✓ Ask learners to solve the SAMPLE SELF CHECK 5.6 and send the answers through Google Classroom or any other social media platforms.

- ✓ Frame questions using different sources and let the learners submit answers through Google Classroom or any other social media platforms.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ CBLM
- ✓ PPT

**A. Competency/Competencies:**

- i. Geyser is fixed as per the job requirement following standard procedures.

**B. Learning objectives/Topic:**

Learning objectives	Topic
5.7.1 Define geyser 5.7.2 Explain the types of geysers 5.7.3 State the advantages and disadvantages of geyser 5.7.4 Explain the components of geysers 5.7.5 State the location of geyser 5.7.6 <i>Ensure safe handling of tools, equipment and materials</i> 5.7.7 <i>Ensure to use PPE</i>	<b>5.7 Fixing geyser</b>  <b>Overview:</b> The topic is about the types, advantages and disadvantages, components and location of geyser. Its enables the learners to fix geyser correctly.

**C. Learning Experiences:**

- ✓ Make learners go through INFORMATION SHEET 5.7
- ✓ Provide PPT on fixing geyser.
- ✓ Make learners go through OPERATION SHEET 5.7
- ✓ Demonstrate on OPERATION SHEET 5.7
- ✓ Provide guided practice on OPERATION SHEET 5.7
- ✓ Make learners go through INFORMATION SHEET 5.7 and OPERATION SHEET 5.7 through Google Classroom.
- ✓ Provide PPT on types of valve and their application through Audiovisual

**D. Assessment:**

- ✓ Make learners solve SAMPLE SELF CHECK 5.7 and give additional questions from CBLM.
- ✓ Conduct a test (quiz, true or false, puzzle or short answer type questions) through Kahoot.

- ✓ Make learners solve SAMPLE SELF CHECK 5.7 and give additional questions from CBLM and instruct them to send their works through Google Classroom or any other resources.
- ✓ Conduct a test (quiz, true or false, puzzle or short answer type questions) using Kahoot through Google Classroom.

**E. Resources:**

- ✓ CBLM
- ✓ PPT

**A. Competency/Competencies:**

- i. Urinal is fixed as per the job requirement following standard procedures.

**B. Learning objectives/Topic:**

Learning objectives	Topic
5.8.1 Define urinal 5.8.2 Explain the types of urinals and their applications 5.8.3 <i>Ensure safe handling of tools, equipment and materials</i> 5.8.4 <i>Ensure to use PPE</i>	<b>5.8 Fixing urinal</b>  <b>Overview:</b> The topic is about types of urinal and their application and it enables the learners to fix geyser.

**C. Learning Experiences:**

- ✓ Make learners go through the INFORMATION SHEET 5.8
- ✓ Share the web link <https://www.youtube.com/watch?v=LgZBAwf2I3M> which explains on the fixing urinal
- ✓ Make learners go through OPERATION SHEET 5.8.
- ✓ Demonstrate on OPERATION SHEET 5.8
- ✓ Provide guided practice on OPERATION SHEET 5.8
- ✓ Make learners go through the INFORMATION SHEET 5.1 of CBLM through Google Classroom.
- ✓ Provide PPT on sign and symbol of water pump through audiovisual.
- ✓ Share the web <https://www.youtube.com/watch?v=LgZBAwf2I3M> which explains on the fixing urinal
- ✓ Make learners go through OPERATION SHEET 5.8

**D. Assessment:**

- ✓ Make learners perform OPERATION SHEET 5.1 and keep on practicing while performing any task.
- ✓ Make learners answer the SAMPLE SELF CHECK 3.2 with additional questions.
- ✓ Assess learners' performance using a rubric.



- ✓ Make learners answer the SAMPLE SELF CHECK 3.2 with additional questions and send it through Google Classroom.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ CBLM
- ✓ <https://www.youtube.com/watch?v=LgZBAwf2l3M> ( to fix uniral)

**A. Competency/Competencies:**

- i. Fix bathroom accessories as per the standard practices.

**B. Learning objectives/Topic:**

Learning objectives	Topic
5.9.1 Define bathroom accessories 5.9.2 State the types of bathroom accessories and their uses 5.9.3 List the standard dimensioning for bathroom accessories 5.9.4 <i>Ensure safe handling of tools and materials</i> 5.9.5 <i>Ensure to use PPE</i>	<p><b>5.9 Fixing bathroom accessories</b></p> <p><b>Overview:</b> The topic is about the types of bathroom accessories, their uses, and standard dimension for bathroom accessories and it enables the learners to fix the accessories.</p>

**C. Learning Experiences:**

- ✓ Make learners go through INFORMATION SHEET 5.9.
- ✓ Demonstrate on the OPERATION SHEET 5.9.
- ✓ Provide guided Practices.
- ✓ Let them practices individually.
- ✓ Make learners go through INFORMATION SHEET 5.9.
- ✓ Make learners go through OPERATION SHEET 5.9

**D. Assessment:**

- ✓ Make learners perform OPERATION SHEET 5.9 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Make learners solve the SAMPLE SELF CHECK 5.9
- ✓ Assess the learner’s ability through conducting oral tests/ written tests.
- ✓ Make learners solve the SAMPLE SELF CHECK 5.9 and send it through Google Classroom.

- ✓ Frame questions using different sources and let the learners submit answers through Google Classroom or any other social media platforms.
- ✓ Written test through Kahoot.
- ✓ Assess through oral/viva-voce

**E. Resources:**

- ✓ CBLM
- ✓ PPT

**RESOURCES**

- 1) Technical and Vocational Education and Training (TVET) New Normal Curriculum Framework (Classes: PP-XII)
- 2) Competency-Based Learning Materials (Plumbing).