

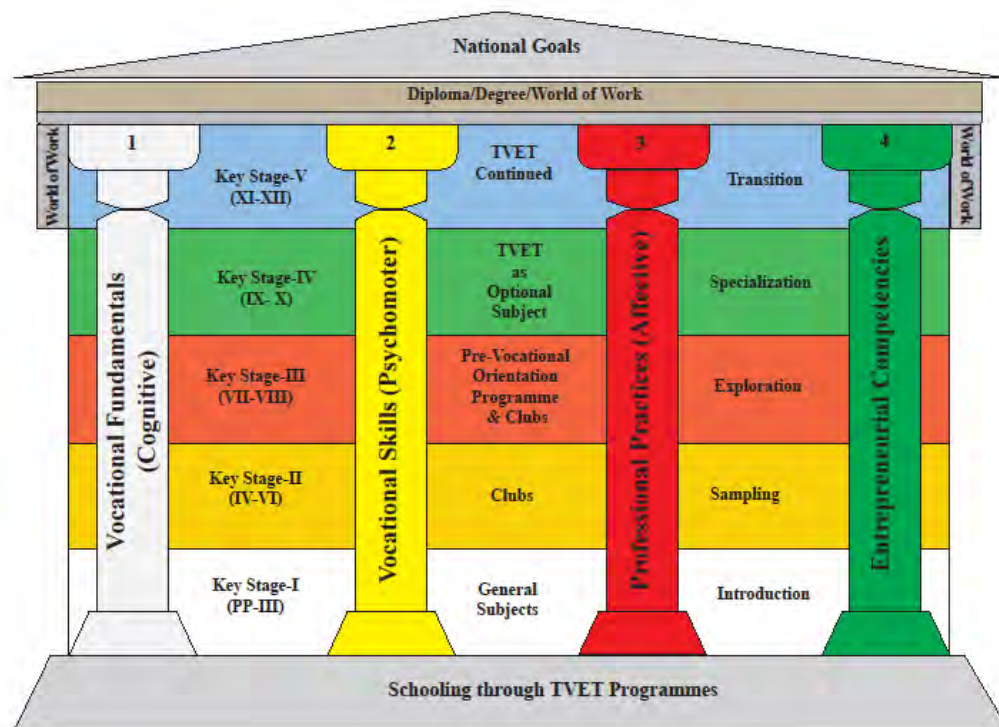
# TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING (TVET)

## NEW NORMAL CURRICULUM

### INSTRUCTIONAL GUIDE

(PLUMBING)

CLASS: IX



**Royal Education Council**

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## FOREWORD

COVID-19 has suddenly caused unforgiving disruptions in the 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 learning and teaching in traditional settings with physical interactions to the maximum in terms of relevancy and efficiency. This has caused a major problem for children living in poverty worldwide, who often rely on the physical settings of their schools for educational materials, guidance, and, sometimes, the only decent meal of the day.

In the new normal education, human interaction and well-being is a priority. Technology, particularly digital technology that enables communication, collaboration and learning across distance, is a formidable tool – not a panacea but 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 will 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 New Normal 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 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.

**Kinga Dakpa,**

**Director General**

## INTRODUCTION

Technical and Vocational Education and Training (TVET) is education and training which provides knowledge and skills for employment. It comprises of education, training and skills development related to a wide range of occupational fields, production, services and livelihood. The Royal Education Council and Ministry of Education envisage 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) under the Ministry of Education 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 under Ministry of Education, 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 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 New Normal Curriculum Instructional Guide is prepared not only to encourage blended learning but also to facilitate remote learning. Thus, the guide would help the schools to implement the curriculum effectively without limiting to contact teaching/learning besides using a variety of pedagogies.

## TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	i
FOREWORD .....	ii
INTRODUCTION .....	iii
Chapter 1: Practicing Occupational Health and Safety (OHS).....	1
1.1 Applying Principle of 5S .....	1
1.2 Using PPE.....	3
1.3 Maintaining workplace and personal safety .....	5
1.3 Maintaining tools and equipment safety.....	7
1.5 Using fire extinguisher .....	9
Chapter 2: Carrying out the installation of the internal domestic water system .....	11
2.1 Identifying water pipes and fittings.....	11
2.2 Identifying tools and equipment .....	12
2.3 Estimating materials .....	13
2.4 Cutting pipe .....	14
ENGINEERING DRAWING .....	16
Chapter 1: Interpreting Basic Engineering Drawing .....	16
1.1 Using drawing instruments .....	16
1.2 Laying out drawing sheet .....	17
1.3 Interpreting engineering sign, symbols, and abbreviation.....	18
1.4 Drawing different types of lines .....	19
1.5 Drawing letters and numbers .....	20
1.6 Providing dimensions .....	21
RESOURCES .....	22

## Chapter 1: Practicing Occupational Health and Safety (OHS)

### A. Learning objective / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
1.1.1 Define 5S. 1.1.2 State the purposes of 5S. 1.1.3 Explain the principle of 5S. 1.1.4 Define OHS. 1.1.5 State the importance of OHS. 1.1.6 Explain the rights for employee. 1.1.7 State the main causes of accidents. 1.1.8 State the safety rules. 1.1.9 Ensure appropriate use of PPE. 1.1.10 Ensure to refer OHS manual. 1.1.11 Apply principles of 5S.	<b>1.1 Applying Principles of 5S</b>

### B. Competencies:

- i) Practise OHS procedures in any task for safety.

### C. Pedagogy/Learning Experiences

#### • Contact:

- ✓ Make learners read INFORMATION SHEET 1.1
- ✓ Provide handouts to learners.
- ✓ Share the web link <https://youtu.be/n9sxq34D9HQ> with the learners which explains the principles of 5S.
- ✓ Make learners perform OPERATION SHEET 1.1
- ✓ Let the learners discuss in a group and do a presentation on 5S using PPT, handouts, demonstration, and short video clips to explain 5S.

#### • Non-contact:

- ✓ Instruct learners to read INFORMATION SHEET 1.1 through Google Classroom.
- ✓ Share the web link <https://youtu.be/n9sxq34D9HQ> which explains the principles of 5S.
- ✓ Provide handouts, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.
- ✓ Instruct learners through Google classroom to read OPERATION SHEET 1.1 (The learners may arrange available tools and materials at home)
- ✓ Let the learners discuss in a group and submit their responses through Google classroom or any other relevant social media.

**D. Assessment:**

- **Contact:**
  - ✓ Make learners read INFORMATION SHEET 1.1 and perform OPERATION SHEET 1.1 and assess them using a checklist/performance guide. Provide necessary intervention.
  - ✓ Assess learner's knowledge about 5S by asking questions.
  - ✓ Conduct class tests to assess their understanding.
  - ✓ Let learners carry out activities of the SAMPLE SELF CHECK 1.1
  - ✓ Let the learners do a presentation and assess as per the rubric developed.
  
- **Non-contact:**
  - ✓ Make learners read INFORMATION SHEET 1.1 and perform OPERATION SHEET 1.1 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 1.1 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from another resources-Text book/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 (online and offline):**

- ✓ Competency-Based Learning Materials for Classes IX, REC
- ✓ Handouts
- ✓ <https://youtu.be/n9sxq34D9HQ> (Explanation on principles of 5S)

**A. Learning objective / Broad theme / Strand/Chapter:**

<b>. Learning objectives</b>	<b>Core concept(Chapters/Topics)</b>
1.2.1 Define PPE. 1.2.2 State the importance of PPE. 1.2.3 List the categories of PPE. 1.2.4 Use PPE. 1.2.5 <i>Ensure to use appropriate PPE.</i> 1.2.6 <i>Ensure safe disposal of damaged PPE.</i> 1.2.7 <i>Ensure not to use defective and damaged PPE.</i>	<b>1.2 Using PPE</b>

**B. Competencies:**

- i) Make appropriate use of PPE.

**C. Pedagogy/Learning Experiences**

• **Contact:**

- ✓ Make learners read INFORMATION SHEET 1.2
- ✓ Provide handouts to learners.
- ✓ Share the web links <https://youtu.be/r9vp1q1L2ro>, and <https://www.youtube.com/watch?v=DMBrRNV9Hrk> which explain using PPE.
- ✓ Make learners perform OPERATION SHEET 1.2
- ✓ Let the learners discuss in a group and do a presentation on PPE using PPT, handouts, demonstration, and short video clips to explain PPE.

• **Non-contact:**

- ✓ Instruct learners to read INFORMATION SHEET 1.2 through Google Classroom.
- ✓ Share the web link <https://youtu.be/r9vp1q1L2ro> and <https://www.youtube.com/watch?v=DMBrRNV9Hr> which explains on using PPE
- ✓ Provide handouts, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.
- ✓ Instruct learners to perform OPERATION SHEET 1.2 through Google Classroom.
- ✓ Let the learners discuss in a group and submit their responses through Google classroom or any other relevant social media.

**D. Assessment:**

• **Contact:**

- ✓ Make learners read INFORMATION SHEET 1.2 and perform OPERATION SHEET 1.2 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Assess learner's knowledge about PPE by asking questions.
- ✓ Conduct class tests to assess their understanding.
- ✓ Let learners carry out activities of the SAMPLE SELF CHECK 1.2



- ✓ Let the learners do a presentation and assess as per the rubric developed.
- **Non-contact:**
  - ✓ Make learners read INFORMATION SHEET 1.2 and perform OPERATION SHEET 1.2 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 1.2 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from other resources- Textbook/Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms. Use rubric for assessment.

**E. Resources (online and offline):**

- ✓ Competency-Based Learning Materials for class IX.
- ✓ <https://www.youtube.com/watch?v=DMBrRNV9Hr> and <https://youtu.be/r9vp1q1L2ro> (Explanation on PPE)

## A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
<p>1.3.1 Define safety precaution.</p> <p>1.3.2 List the different types of safety</p> <p>1.3.1 Explain workshop and personal safety.</p> <p>1.3.2 State the importance of maintaining a workplace and personal safety.</p> <p>1.3.3 Explain the importance of safety signs and symbols.</p> <p>1.3.4 Explain the Emergency exit.</p> <p>1.3.5 Describe the layout of the workshop.</p> <p>1.3.6 <i>Ensure to follow OHS procedures.</i></p> <p>1.3.7 <i>Ensure to keep the workshop clean.</i></p> <p>1.3.10 <i>Ensure to ring the alarm bell before the accident spreads over.</i></p> <p>1.3.11 <i>Ensure to display safety signs and symbols.</i></p> <p>1.3.12 <i>Ensure to use appropriate PPE in the workplace.</i></p> <p>1.3.13 <i>Ensure to avoid horseplay at the workplace.</i></p> <p>1.3.14 <i>Ensure to avoid smoking and eating inside the workshop.</i></p> <p>1.3.15 <i>Ensure to avoid working under influence of alcohol.</i></p>	<p><b>1.3 Maintaining workplace and personal safety</b></p>

## B. Competencies

- i) Maintain workplace and personal safety as per job requirements.

## C. Pedagogy/Learning experience

- **Contact:**

- ✓ Make learners read INFORMATION SHEET 1.3
- ✓ Provide handouts to learners.
- ✓ Share the web links <https://www.youtube.com/watch?v=4bkr5lpKGUM> and <https://www.youtube.com/watch?v=WW0U6o1XNec> which explains the maintaining of the workplace and personal safety.
- ✓ Make learners perform OPERATION SHEET 1.3
- ✓ Let the learners discuss in a group and do a presentation on maintaining a workplace and personal safety using PPT, handouts, demonstration, and short video clips to explain maintaining of the workplace and personal safety.

- **Non-contact:**

- ✓ Instruct learners to read INFORMATION SHEET 1.3 through Google Classroom.
- ✓ Share the web links <https://www.youtube.com/watch?v=4bkr5lpKGUM> and <https://www.youtube.com/watch?v=WW0U6o1XNec> which explains the maintaining of the workplace and personal safety.
- ✓ Provide handouts, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.
- ✓ Instruct learners to perform OPERATION SHEET 1.3 through Google Classroom.
- ✓ Let the learners discuss in a group and submit their responses through Google classroom or any other relevant social media.

**D. Assessment:**

- **Contact:**

- ✓ Make learners read INFORMATION SHEET 1.3 and perform OPERATION SHEET 1.3 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Assess learner's knowledge about maintaining a workplace and personal safety by asking questions.
- ✓ Conduct class tests to assess their understanding.
- ✓ Let learners carry out activities of the SAMPLE SELF CHECK 1.3
- ✓ Let the learners do a presentation and assess as per the rubric developed.

- **Non-contact:**

- ✓ **Make** learners read INFORMATION SHEET 1.3 and perform OPERATION SHEET 1.3 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 1.3 and submit the answer through google classroom or any other relevant social media.
- ✓ Give additional relevant questions from another resources-Text book/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 (online and offline):**

- ✓ CBLM of Classes, REC
- ✓ <https://www.youtube.com/watch?v=WW0U6o1XNec> and <https://www.youtube.com/watch?v=4bkr5lpKGUM> (Explanation on workplace and personal safety)

## A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
1.4.1 Explain tool and equipment safety. 1.4.2 State the importance of maintaining tool and equipment safety. 1.4.3 List the dos and don'ts for tool and equipment safety. <i>1.4.4 Ensure all the tools are in workable condition</i> <i>1.4.5 Ensure to keep tools clean and dry and store them properly after use.</i> <i>1.4.6 Ensure to operate the machine when instructed.</i> <i>1.4.7 Ensure to refer manual before the operation of tools and equipment.</i>	<b>1.3 Maintaining tools and equipment safety</b>

## B. Competencies

- i) Maintain hand tools and portable power tools for better performance.

## C. Pedagogy/Learning experience

### • Contact:

- ✓ Make learners read INFORMATION SHEET 1.4
- ✓ Provide handouts to learners.
- ✓ Share the web links <https://www.bramptonguardian.com> or <http://www.ehsdb.com/dos-and-donts--hand-tools-equipments.php> which explains Maintaining tools and equipment safety.
- ✓ Make learners perform OPERATION SHEET 1.4
- ✓ Let the learners discuss in a group and do a presentation on Maintaining tools and equipment safety using PPT, handouts, demonstration, and short video clips to explain Maintaining tools and equipment safety.

### • Non-contact:

- ✓ Instruct learners to read INFORMATION SHEET 1.4 through Google Classroom.
- ✓ Share the web links <https://www.bramptonguardian.com> or <http://www.ehsdb.com/dos-and-donts--hand-tools-equipments.php> which explains about the Maintain tools and equipment safety.
- ✓ Provide handouts, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.
- ✓ Instruct learners to perform OPERATION SHEET 1.4 through Google Classroom. (The learners may arrange available tools and materials at home)
- ✓ Let the learners discuss in a group and submit their responses through Google classroom or any other relevant social media.

#### **D. Assessment:**

- **Contact:**

- ✓ Make learners read INFORMATION SHEET 1.4 and perform OPERATION SHEET 1.4 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Assess learner's knowledge about maintaining tools and equipment safety by asking questions.
- ✓ Conduct class tests to assess their understanding.
- ✓ Let learners carry out activities of the SAMPLE SELF CHECK 1.4
- ✓ Let the learners do a presentation on maintaining tools and equipment safety and assess as per the rubric developed.

- **Non-contact:**

- ✓ Let the student solve SAMPLE SELF CHECK 1.4 and submit the answer through google classroom or any other relevant social media.
- ✓ Give additional relevant questions from another resources-Text book/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 (online and offline):**

- ✓ Competency-Based Learning Materials for Classes IX, REC
- ✓ <https://www.bramptonguardian.com> or <http://www.ehsdb.com/dos-and-donts--hand-tools-equipments.php> (Explanation on maintaining tool and equipment safety)

### A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
1.5.1 Define fire extinguisher. 1.5.2 Label the parts of the fire extinguisher. 1.5.3 Explain the types of fires. 1.5.4 Explain the types of fire extinguishers. 1.5.5 State the methods of combating/extinguishing fires. <i>1.5.6 Ensure to read the instructions provided on the fire extinguisher.</i> <i>1.5.7 Ensure appropriate use of PPE.</i>	<b>1.5 Using fire extinguisher</b>

### B. Competencies

- i) Use a fire extinguisher as per the standard procedure.

### C. Pedagogy/Learning Experiences

- **Contact**

- ✓ Make learners read INFORMATION SHEET 1.5
- ✓ Provide handouts to learners.
- ✓ Share the web link <https://www.youtube.com/watch?v=PQV71INDaqY> which explains the usage of fire extinguishers.
- ✓ Make learners perform OPERATION SHEET 1.5
- ✓ Let the learners discuss in a group and do a presentation on how to use fire extinguishers using PPT, handouts, demonstration, and short video clips to explain the usage of fire extinguishers.

- **Non-contact:**

- ✓ Instruct learners to read INFORMATION SHEET 1.5 through Google Classroom.
- ✓ Share the web link <https://www.youtube.com/watch?v=PQV71INDaqY> which explains usage of a fire extinguisher.
- ✓ Provide handouts, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.
- ✓ Instruct learners to perform OPERATION SHEET 1.5 through Google Classroom. (The learners may arrange available tools and materials at home)
- ✓ Let the learners discuss in a group and submit their responses through Google classroom or any other relevant social media.

#### **D. Assessment:**

- **Contact:**

- ✓ Make learners read INFORMATION SHEET 1.5 and perform OPERATION SHEET 1.5 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Assess learner's knowledge about how to use fire extinguishers by asking questions.
- ✓ Conduct class tests to assess their understanding.
- ✓ Let learners carry out activities of the SAMPLE SELF CHECK 1.5
- ✓ Let the learners do a presentation on using of fire extinguisher and assess as per the rubric developed.

- **Non-contact:**

- ✓ Make learners read INFORMATION SHEET 1.5 and OPERATION SHEET 1.5 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.
- ✓ Let the student solve SAMPLE SELF CHECK 1.5 and submit the answer through google classroom or any other relevant social media.
- ✓ Give additional relevant questions from another resources-Text book/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 (online and offline):**

- ✓ CBLM, REC
- ✓ <https://www.youtube.com/watch?v=PQV71INDaqY> (Explanation on fire extinguisher)

**A. Learning objective / Broad theme / Strand/Chapter:**

**Chapter 2: Carrying out the installation of the internal domestic water system**

<b>Learning objectives</b>	<b>Core concepts (Chapters/Topics)</b>
2.1.1 Define pipe. 2.1.2 Explain the types of internal pipes and their uses. 2.1.3 Explain the types of internal fitting and their uses. 2.1.4 State the advantages and disadvantages of different pipes. 2.1.5. Identity pipes and fittings.	<b>2.1 Identifying water pipes and fittings</b>

**B. Competencies:**

- i) Identify all types of pipes and fittings as per job requirements.

**C. Pedagogy/Learning Experiences**

- **Contact:**
  - ✓ Make learners go through INFORMATION SHEET 2.1.
  - ✓ Make learners go through OPERATION SHEET 2.1
  - ✓ Let the learners discuss in a group and do a presentation on the type of internal pipe and their uses using PPT, handouts, demonstration, and short video clips to explain the usage of fire extinguisher
  - ✓ Arrange site visit
- **Non-contact:**
  - ✓ Provide handouts on types of internal pipe and fitting to learners through Google Classroom or any other social media platforms.
  - ✓ An instructor may provide the web link <https://youtu.be/XMjnk36Ktfg> that explains the fittings of the pipe.
  - ✓ Provide handouts, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.

**D. Assessment:**

- **Contact:**
  - ✓ Make learners perform OPERATION SHEET 2.1 and assess them using a checklist/performance guide. Provide necessary intervention.
  - ✓ Make learners solve the SAMPLE SELF CHECK 2.1.
  - ✓ Give additional questions from CBLM and other resources-Google/YouTube.
- **Non-contact:**
  - ✓ Make learners solve the SAMPLE SELF CHECK 2.1 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.

**E. Resources (online and offline):**

- Competency-Based Learning Materials for Classes IX and X, REC
- Handout
- <https://youtu.be/XMjnk36Ktfg>(Explanation on pipe fittings)



**A. Learning objective / Broad theme / Strand/Chapter:**

Learning objectives	Core concepts (Chapters/Topics)
2.2.1 Define tools and equipment. 2.2.2 Explain types of tools and their uses. 2.2.3 Explain types of equipment and their uses. 2.2.4 Identify tools and equipment.	<b>2.2 Identifying tools and equipment</b>

**B. Competencies:**

- i) Use the right tools for the right job

**C. Pedagogy/Learning Experiences**

• **Contact:**

- ✓ The learners should read INFORMATION SHEET 2.2 and go through OPERATION SHEET 2.1
- ✓ Share the web link <https://www.scribd.com/document/306228560/Plumbing-Tools> which explains about tools and equipment.
- ✓ Arrange site visit.

• **Non-contact:**

- ✓ Provide handouts to learners through Google Classroom or any other social media platforms.
- ✓ An instructor may provide the web link <https://www.scribd.com/document/306228560/Plumbing-Tools> which explains about tools and equipment.

**D. Assessment:**

• **Contact:**

- ✓ Make learners should read INFORMATION SHEET 2.2 and perform OPERATION SHEET 2.2 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Make learners solve the SAMPLE SELF CHECK 2.2 that fulfills objectives and competency.
- ✓ Conduct class test by giving additional questions from CBLM

• **Non-contact:**

- ✓ Make learners solve the SAMPLE SELF CHECK 2.2 that fulfills objectives and competency. Send answers through Google Classroom or any other social media platforms.
- ✓ Conduct class test through Kahoot (quiz, true and false, short answer question)

**E. Resources (online and offline):**

- Competency-Based Learning Materials for Classes IX and X, REC
- Handout
- <https://www.scribd.com/document/306228560/Plumbing-Tools>(Explanation on tools and equipment)

**A. Learning objective / Broad theme / Strand/Chapter:**

<b>Learning objectives</b>	<b>Core concepts (Chapters/Topics)</b>
2.3.1 Define estimation and costing. 2.3.2 Explain the importance of estimation and costing. 2.3.3 Explain different methods of estimation. 2.3.4 List down the data required for estimation. 2.3.5 Estimate materials	<b>2.3 Estimating materials</b>

**B. Competencies**

- i) Carry out estimation and costing for any task using BSR

**C. Pedagogy/Learning experience**

- **Contact:**
  - ✓ Make learners go through INFORMATION SHEET 2.3.
  - ✓ Make learners go through OPERATION SHEET 2.3
  - ✓ Provide PPT on a different method of estimation, the importance of estimation, and cost.
  - ✓ Provide handouts with a sample to calculate estimation and costing.
- **Non-contact:**
  - ✓ Make learners go through INFORMATION SHEET 2.3.
  - ✓ Provide handouts with a sample to calculate estimation and costing.
  - ✓ Provide PPT on a different method of estimation, the importance of estimation, and costing through Camtasia.
  - ✓ Make learners go through OPERATION SHEET 2.3

**D. Assessment**

- **Contact:**
  - ✓ Give a simple drawing and instruct learners to perform OPERATION SHEET 2.3 referring to BSR provided in groups and assess them using a checklist/performance guide. Provide necessary intervention.
  - ✓ Make learners solve SAMPLE SELF CHECK 2.3.
  - ✓ Provide additional questions from CBLM and the link provided above.
- **Non-contact:**
  - ✓ Give a simple drawing and instruct learners to perform OPERATION SHEET 2.3 referring to BSR provided through Google Classroom.
  - ✓ Make learners solve SAMPLE SELF CHECK 2.3 and instruct them to send it through Google Classroom.
  - ✓ Provide additional questions from CBLM and the link provided above and instruct them to send it through Google Classroom.

**E. Resources (online and offline)**

- CBLM for Classes IX, REC
- PPT

**A. Learning objective / Broad theme / Strand/Chapter:**

Learning objectives	Core concepts (Chapters/Topics)
2.4.1 Ensure appropriate use of PPE. 2.4.2 Define marking tool. 2.4.3 Explain the purpose of marking tools. 2.4.4 Identify types of marking tools. 2.4.5 Define cutting tool. 2.4.6 Explain types of cutting tools and their respective functions. 2.4.7 Explain the importance of body position while cutting the pipe. 2.4.8 Differentiate between pipe cutter and hacksaw 2.4.9 Set hacksaw blade in the forward direction for proper cutting. 2.4.10 Label the parts of cutting tools. 2.4.11 Explain the purposes of applying lubricant. 2.4.12 List the types of vice and their usage. 2.4.13 Use hacksaw. 2.4.14 Use pipe cutter. 2.4.15 Cut pipe	2.4 Cutting pipe

**B. Competencies:**

- i) Cut pipe as per job requirement.

**C. Pedagogy/Learning Experiences**

• **Contact:**

- ✓ Make the learners should read INFORMATION SHEET 2.4 and OPERATION SHEET 2.4
- ✓ Share the web link <https://youtu.be/JNqn4iSq9s> and <https://youtu.be/wtuTOR8OPZI> which explain cutting pipe by pipe cutter.
- ✓ Share the web link [https://youtu.be/YkFt\\_53rRxs](https://youtu.be/YkFt_53rRxs) which explains cutting pipe by hacksaw.
- ✓ Demonstrate the pipe cutting through guided practice.

• **Non-contact:**

- ✓ Make learners go through INFORMATION SHEET 2.4 and OPERATION SHEET 2.4
- ✓ Provide handouts to learners through Google Classroom or any other social media platforms.
- ✓ Share the web link <https://youtu.be/JNqn4iSq9s> and <https://youtu.be/wtuTOR8OPZI> which explain cutting pipe by pipe cutter.
- ✓ Share the web link [https://youtu.be/YkFt\\_53rRxs](https://youtu.be/YkFt_53rRxs) which explain cutting pipe by hacksaw

**D. Assessment:**

- **Contact:**

- ✓ Make learners should read and perform INFORMATION SHEET 2.4 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Make learners solve the SAMPLE SELF CHECK 2.4 that fulfills objectives and competency.
- ✓ Conduct class test by giving additional questions from CBLM

- **Non-contact:**

- ✓ Make learners solve the SAMPLE SELF CHECK 2.2 that fulfills objectives and competency. Send answers through Google Classroom or any other social media platforms.
- ✓ Conduct class test through Kahoot ( quiz, true and false, short answer question)

**E. Resources (online and offline):**

- Competency-Based Learning Materials for Classes IX.
- Handout
- <https://youtu.be/wtuTOR8OPZI> (Cutting pipe using pipe cutter)
- [https://youtu.be/YkFt\\_53rRxS](https://youtu.be/YkFt_53rRxS). (Cutting pipe using a hacksaw)

# ENGINEERING DRAWING

## MODULE: INTERPRETING ENGINEERING DRAWING

### Chapter 1: Interpreting Basic Engineering Drawing

#### A. Learning objectives/Broad theme/Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
1.1.1 Define Engineering Drawing. 1.1.2 State the purposes of engineering drawing. 1.1.3 List the types and uses of drawing instruments. 1.1.4 List the sizes of drawing papers. 1.1.5 Use drawing instruments. 1.1.6 <i>Ensure proper handling of drawing instruments.</i> 1.1.7 <i>Ensure proper disposal of waste.</i>	<b>1.1 Using drawing instruments</b>

#### B. Competencies:

- i) Carry out basic engineering drawing.
- ii) Handle the drawing instrument properly.

#### C. Pedagogy/Learning Experiences

- **Contact:**

- ✓ Make learners read INFORMATION SHEET 1.1.
- ✓ Show the real instruments to the learners which are required for the drawing.
- ✓ Make learners read and perform OPERATION SHEET 1.1 through guided practice.
- ✓ Ask learners to solve the SAMPLE SELF CHECK 1.1.

- **Non-contact:**

- ✓ Share the web link <https://youtu.be/0Q6QwvtjVm8> OR [https://youtu.be/kLe\\_brmh774](https://youtu.be/kLe_brmh774) which explains more about drawing instrument and their uses.
- ✓ Instruct learners to read INFORMATION SHEET 1.1 and OPERATION SHEET 1.1 through Google Classroom.
- ✓ Instruct learners to solve the SAMPLE SELF CHECK 1.1 and send it through Google Classroom.

#### D. Assessment:

- **Contact:**

- ✓ Assess learners' ability to use drawing instruments using a rubric.
- ✓ Assess learners' response to the SAMPLE SELF CHECK 1.1.
- ✓ Provide feedback.

- **Non-contact:**

- ✓ Assess learners' response to the SAMPLE SELF CHECK 1.1.
- ✓ Provide feedback through Google Classroom.

#### E. Resources (online and offline):

- CBLM for Classes IX and X, REC
- <https://youtu.be/0Q6QwvtjVm8> / [https://youtu.be/kLe\\_brmh774](https://youtu.be/kLe_brmh774) (Drawing instruments and their uses)

**A. Learning objectives/Broad theme/Strand/Chapter:**

Learning objectives	Core concepts (Chapters/Topics)
1.2.1 Define the layout of a drawing sheet. 1.2.2 Define the title block. 1.2.3 Layout drawing sheet. 1.2.4 <i>Ensure to maintain cleanliness and neatness of drawing.</i> 1.2.5 <i>Ensure proper handling of drawing instruments.</i> 1.2.6 <i>Ensure that the sheet edges are not damaged while handling the drawing.</i>	<b>1.2 Laying out drawing sheet</b>

**B. Competencies**

- i) Layout the drawing sheet as per the required dimension.

**C. Pedagogy/Learning Experience**

- **Contact:**
  - ✓ Make the learners read INFORMATION SHEET 1.2.
  - ✓ Ask learners to read and perform OPERATION SHEET 1.2 through guided practice.
  - ✓ Ask learners to solve the SAMPLE SELF CHECK 1.2.
- **Non-contact:**
  - ✓ Instruct the learners to read INFORMATION SHEET 1.2 through Google Classroom.
  - ✓ Share the web link <https://youtu.be/FzMPAiW8O-s> which shows the drawing sheet layout.
  - ✓ Ask learners to read and perform OPERATION SHEET 1.2 in A4 size paper and submit it through Google Classroom.

**D. Assessment:**

- **Contact:**
  - ✓ Assess learners' ability to draw layout and title block of drawing sheet using the rubric.
  - ✓ Assess learners' response to the SAMPLE SELF CHECK 1.2.
  - ✓ Provide feedback.
- **Non-contact:**
  - ✓ Instruct learners to solve the SAMPLE SELF CHECK 1.2 and submit it through Google Classroom. Assess learners' response to the SAMPLE SELF CHECK 1.2.
  - ✓ Provide feedback through Google Classroom.

**E. Resources (online and offline):**

- CBLM for Classes IX and X, REC
- <https://youtu.be/FzMPAiW8O-s> (Drawing layout sheet)

### A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
1.3.1 Define sign and symbol. 1.3.2 Define abbreviation. 1.3.3 Draw engineering signs, symbols, and abbreviations. 1.3.4 Interpret engineering signs, symbols, and abbreviations. <i>1.3.5 Ensure to maintain cleanliness and neatness of drawing.</i> <i>1.3.6 Ensure proper handling of drawing instruments.</i>	<b>1.3 Interpreting engineering sign, symbols, and abbreviation</b>

### D. Competencies

- i) Interpret sign and symbol as required.

### C. Pedagogy/Learning experience

#### • Contact:

- ✓ Make learners read INFORMATION SHEET 1.3.
- ✓ Make learners read and perform the OPERATION SHEET 1.3 ensuring the proper handling of drawing instruments.
- ✓ Make learners answer the SAMPLE SELF CHECK 1.3.

#### • Non-contact:

- ✓ Instruct learners to read INFORMATION SHEET 1.3 through Google Classroom.
- ✓ Share the web link <https://youtu.be/MfNoq0y1LLY> that shows the convention of materials through Google Classroom.
- ✓ Instruct learners to read OPERATION SHEET 1.3 through Google Classroom.
- ✓ Instruct learners to answer the SAMPLE SELF CHECK 1.3 and submit it through Google Classroom.

### D. Assessment

#### 1. Contact:

- ✓ Assess learners' ability to draw engineering signs, symbols, and abbreviations using a rubric.
- ✓ Assess learners' response to the SAMPLE SELF CHECK 1.3.
- ✓ Provide feedback.

#### 2. Non-contact:

- ✓ Assess learners' response to the SAMPLE SELF CHECK 1.3.
- ✓ Provide feedback through Google Classroom.

### E. Resources (online and offline)

- CBLM of Classes IX and X, REC
- <https://youtu.be/MfNoq0y1LLY> (Convention of materials)

### A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
1.4.1 Define line. 1.4.2 State the types of lines and their application. 1.4.3 Draw different types of lines. 1.4.4 <i>Ensure proper handling of drawing instruments.</i> 1.4.5 <i>Ensure to maintain cleanliness and neatness of drawing.</i>	<b>1.4 Drawing different types of lines</b>

### D. Competencies

- i) Draw different types of lines as per their application.

### E. Pedagogy/Learning experience

#### • Contact:

- ✓ Make learners read the INFORMATION SHEET 1.4.
- ✓ Make learners read and perform OPERATION SHEET 1.4.
- ✓ Ask learners to solve the SAMPLE SELF CHECK 1.4.

#### • Non-contact:

- ✓ Instruct learners to read the INFORMATION SHEET 1.4 through Google Classroom.
- ✓ Share the video links <https://youtu.be/SaOoKpLBfYo> and <https://youtu.be/E6OXZ9OHpVk> that describe the types of line.
- ✓ Instruct students to read and perform OPERATION SHEET 1.4 through Google Classroom.
- ✓ Instruct learners to solve the SAMPLE SELF CHECK 1.4 and submit it through Google Classroom.

### D. Assessment

#### • Contact:

- ✓ Assess learners' ability to draw types of the line using a rubric.
- ✓ Assess learners' response to the SAMPLE SELF CHECK 1.4.
- ✓ Provide feedback.

#### • Non-contact:

- ✓ Assess learners' response to the SAMPLE SELF CHECK 1.4.
- ✓ Provide feedback through Google Classroom.

### E. Resources (online and offline)

- CBLM for Classes IX and X, REC
- <https://youtu.be/SaOoKpLBfYo> / <https://youtu.be/E6OXZ9OHpVk> (Types of line)



## A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
1.5.1 Define lettering and numbering. 1.5.2 Classify the styles of letters. 1.5.3 List the types of letters. 1.5.4 Define freehand lettering. 1.5.5 List the sizes of letters. 1.5.6 State the rules for lettering and numbering. 1.5.7 Draw letters and numbers. 1.5.8 <i>Ensure proper handling of drawing instruments.</i> 1.5.9 <i>Ensure to maintain cleanliness and neatness of drawing.</i>	<b>1.5 Drawing letters and numbers</b>

### B. Competencies

- i) Draw letters and numbers as per the given scale.

### C. Pedagogy/Learning experience

- **Contact:**
  - ✓ Make learners read INFORMATION SHEET 1.5.
  - ✓ Make learners draw lettering and numbering reading the procedure OPERATION SHEET 1.5.
  - ✓ Make students solve the SAMPLE SELF CHECK 1.5.
- **Non-contact**
  - ✓ Instruct learners to read INFORMATION SHEET 1.5 through Google Classroom.
  - ✓ Share the web link <https://youtu.be/onJlaSAkiEs> on lettering in engineering drawing and share the web link to read an article <http://ednotebook.hostgator.co.in/basics-of-engineering-drawing> on basic of engineering drawing.
  - ✓ Instruct learners to read and perform the OPERATION SHEET 1.5 on A4 size paper and submit it through Google Classroom.
  - ✓ Instruct learners to solve the SAMPLE SELF CHECK 1.5 and submit it through Google Classroom.

### D. Assessment

- **Contact:**
  - ✓ Assess learners' ability to perform OPERATION SHEET 1.5 on drawing letters and numbers using a rubric.
  - ✓ Assess learners' response to the SAMPLE SELF CHECK 1.5.
  - ✓ Provide feedback.
- **Non-contact:**
  - ✓ Assess learners' response to the SAMPLE SELF CHECK 1.5.
  - ✓ Provide feedback through Google Classroom.

### E. Resources (online and offline)

- CBLM for Classes IX and X, REC
- <http://ednotebook.hostgator.co.in/basics-of-engineering-drawing> (Basic of engineering drawing)
- <https://youtu.be/onJlaSAkiEs> (Lettering and Engineering)

## A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
1.3.1 Define dimensioning. 1.3.2 State the types of dimensions. 1.3.3 Explain the system of dimensioning. 1.3.4 State the terminologies of dimensions. 1.3.5 State the rules for dimensioning. 1.3.6 Provide dimensions. 1.3.7 <i>Ensure to maintain cleanliness and neatness of drawing.</i> 1.3.8 <i>Ensure proper handling of drawing instruments.</i>	<b>1.6 Providing dimensions</b>

### B. Competencies

- i) Provide dimensions as per standard.

### C. Pedagogy/Learning experience

- **Contact:**
  - ✓ Make learners read INFORMATION SHEET 1.6.
  - ✓ Make learners read and perform OPERATION SHEET 1.6.
  - ✓ Make students solve the SAMPLE SELF CHECK 1.6.
  - ✓ Conduct a class test covering the LESSONS 1.1 to 1.6.
- **Non-contact**
  - ✓ Instruct learners to read INFORMATION SHEET 1.6 of CBLM through Google Classroom.
  - ✓ Share the web link <https://youtu.be/XS0IJsmy-qg> to know more about the dimensioning system in engineering drawing.
  - ✓ Instruct learners to read and perform OPERATION SHEET 1.6 of CBLM in A4 size paper and submit it through Google Classroom.
  - ✓ Conduct a class test through Google Classroom covering the LESSONS 1.1 to 1.6.

### D. Assessment

- **Contact:**
  - ✓ Assess learners' ability to perform OPERATION SHEET 1.6 on providing dimension to drawing using a rubric.
  - ✓ Assess learners' response to the SAMPLE SELF CHECK 1.6.
  - ✓ Assess learners' performance on a class test conducted.
  - ✓ Provide feedback.
- **Non-contact:**
  - ✓ Instruct learners to solve the SAMPLE SELF CHECK 1.6 and submit it through Google Classroom.
  - ✓ Assess learners' response to the SAMPLE SELF CHECK 1.6.
  - ✓ Assess learners' performance on a class test conducted.
  - ✓ Provide feedback through Google Classroom.

### E. Resources (online and offline)

- CBLM for Classes IX and X, REC
- <https://youtu.be/XS0IJsmy-qg> (Dimensioning system in engineering drawing)

## **RESOURCES**

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