

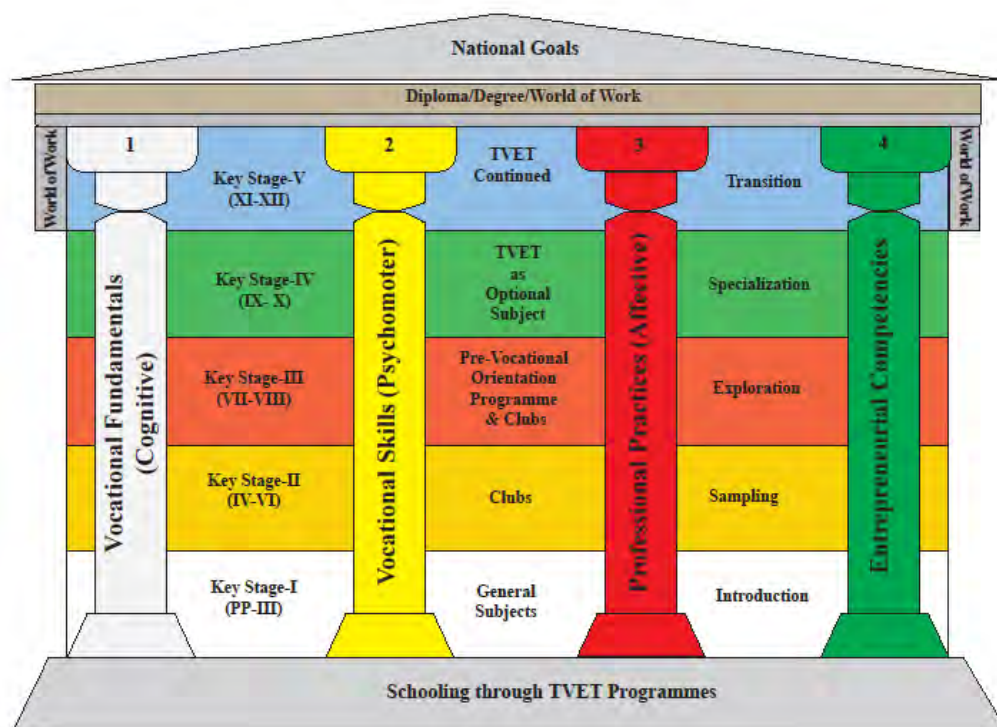
TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING (TVET)

NEW NORMAL CURRICULUM

INSTRUCTIONAL GUIDE

(WELDING)

CLASS: X



Royal Education Council

Paro: Bhutan

Published by:
Royal Education Council,
Royal Government of Bhutan
Tel: +975-8-271226
Fax: +975-8-271991
Website: www.curriculum.bt

Provisional edition 2021

Copyright ©2021 Royal Education Council
All rights reserved. No part of this book may be reproduced in any form without permission from the Royal Education Council, Royal Government of Bhutan.

ACKNOWLEDGEMENTS

The REC would like to acknowledge the assistance provided by the Ministry of Education (MoE), Royal Government of Bhutan in the development of Technical and Vocational Education and Training New Normal Curriculum Instructional Guide for classes IX - XII. The REC also extends its sincere gratitude to all the schools and individuals for their invaluable contributions towards the development of this instructional guide.

Advisors

- i. Kinga Dakpa, Director General, Royal Education Council, Paro
- ii. Wangpo Tenzin, Dean, Curriculum Specialist, REC, Paro

Researchers and writers

- i. Lal Maya Shyangdan, Assistant Instructor, Khuruthang MSS, Punakha
- ii. Tashi Wangmo, Assistant Instructor, Punakha HSS, Punakha
- iii. Kinley Namgyal, Specialist, REC, Paro

Layout Designer

Tashi Zangpo, REC, Paro

ISBN

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
MODULE 1: PERFORMING ARC WELDING.....	1
Chapter 3: Carry out arc welding	1
3.5 Performing metal surface build-up.....	1
3.6 Performing tack weld.....	3
3.7 Welding butt joint in all positions	5
3.8 Welding lap joint in all positions	7
MODULE 1: INTERPRETING ENGINEERING DRAWING	9
Chapter 2: Draw isometric and mechanical parts.....	9
2.9 Converting drawing scale	9
2.10 Drawing Isometric blocks.....	11
2.11 Drawing orthographic projection	13
RESOURCES	15

MODULE 1: PERFORMING ARC WELDING

Chapter 3: Carry out arc welding

A. Learning objectives/broad theme/chapter/Strand/topics:

Learning objectives	Core concepts(Chapters/Topic)
3.5.1 Identify types of welding beads. 3.5.2 State the application and purpose of surface build-up. 3.5.3 Explain types of welding defects and their remedial action. 3.5.4 Demonstrate metal surface build-up technique. 3.5.5 Perform metal surface build-up 3.5.6 <i>Maintain straight line welding beads.</i> 3.5.7 <i>Ensure proper handling of electrode and electrode holder.</i> 3.5.8 <i>Ensure proper handling of arc welding machine.</i> 3.5.9 <i>Ensure appropriate use of PPE.</i>	3.5 Performing metal surface build-up

B. Competencies:

- i. Carry out the metal surface build-up as per the job requirements.
- ii. Maintain the quality of weld beads.

C. Pedagogy/Learning experiences:

• Contact:

- ✓ Let the learners read INFORMATION SHEET 3.5
- ✓ Share the web link <https://www.weldersuniverse.com/welding-beads/> to explore information on two types of welding beads.
- ✓ Share the web link <https://youtu.be/ngg6QS3B6Yw> and <https://youtu.be/oq0PblGi0G4> to explore further information on weld defects
- ✓ Let the learners in the group discuss the types of welding defects and the ways to prevent them (remedies).
- ✓ Let the learners prepare a presentation in the group using chart paper and present it to the whole class.
- ✓ Demonstrate maintaining straight-line weld bead and metal surface build-up referring to SKILL SHEET 3.5 and OPERATION SHEET 3.5.
- ✓ Let the learners perform SKILL SHEET 3.5 and OPERATION SHEET 3.5.
- ✓ Let the learners solve SAMPLE SELF CHECK 3.5.

- **Non-contact:**
 - ✓ Let the learners read INFORMATION SHEET 3.5
 - ✓ Share the web link <https://www.weldersuniverse.com/welding-beads/> to explore information on two types of welding beads.
 - ✓ Share the web link <https://youtu.be/ngg6QS3B6Yw> and <https://youtu.be/oq0PblGi0G4> for further exploration on weld defects.
 - ✓ Let the learners in the group discuss the types of welding defects and the ways to prevent them (remedies) in Meet, Zoom, Skype, etc.
 - ✓ Let the learners solve SAMPLE SELF CHECK 3.5.

D. Assessment

- **Contact:**
 - ✓ Assess the learners' presentation using rubrics.
 - ✓ Let the learners seek and provide feedback to each other.
 - ✓ Assess the learners' ability to perform SKILL SHEET 3.5 and OPERATION SHEET 3.5 and to identify the different types of weld beads, welding defects using a checklist.
 - ✓ Assess the learners' response to SAMPLE SELF CHECK 3.5 to check the conceptual understanding of weld beads and different types of welding defects.
- **Non-contact:**
 - ✓ Assess the learners' presentation uploaded in Google Classroom
 - ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.5 uploaded in Google Classroom using a rubric.
 - ✓ Based on the rating level, provide necessary feedback and intervention.

E. Resources(online and offline)

- Competency-Based Learning Materials for Class X
- <https://youtu.be/ngg6QS3B6Yw> (Explanation on defects)
- <https://youtu.be/oq0PblGi0G4> (Explanation of the welding defects)
- <https://www.weldersuniverse.com/welding-beads/> (Explanation on welding beads)

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

Learning objectives	Core concepts(Chapter/Topic)
3.6.1 Define tack weld. 3.6.2 Explain the tack welding and its importance. 3.6.3 List the types of the welding process. 3.6.4 Perform tack weld 3.6.5 <i>Ensure proper handling of electrode and electrode holder.</i> 3.6.6 <i>Ensure appropriate use of PPE.</i>	3.6 Performing tack weld

B. Competencies:

- i. Tack weld the workpiece as per the standard procedure.

C. Pedagogy/learning experience

- **Contact:**

- ✓ Let the learners read INFORMATION SHEET 3.6
- ✓ Share the following web links:
<https://youtu.be/auP9Yx27UpI>
<https://www.thefabricator.com/thewelder/article/cuttingweldprep/how-to-perform-tack-welding-successfully>
- ✓ Based on the information gathered from the video and the website, let the learners look for information on techniques of tack welding
- ✓ Demonstrate the techniques to weld the tack to align the workpiece and to prevent distortion.
- ✓ Let the learners perform OPERATION SHEET 3.6.
- ✓ Let the learners solve SAMPLE SELFCHEVK 3.6.

- **Non-contact:**

- ✓ Let the learners explore the information on the techniques of tack welding from
<https://youtu.be/auP9Yx27UpI>
<https://www.thefabricator.com/thewelder/article/cuttingweldprep/how-to-perform-tack-welding-successfully>
- ✓ Based on the information gathered from the video and the website, let the learners look for information on techniques of tack welding.
- ✓ Let the learners solve SAMPLE SELFCHEVK 3.6.

D. Assessment

- **Contact:**

- ✓ Assess the notes prepared by the learner on the techniques of tack welding and their conceptual understanding using a checklist.
- ✓ Assess the learners' performance on OPERATION SHEET 3.6.

- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.6 and provide necessary intervention.
- **Non-Contact:**
 - ✓ Assess the notes uploaded in Google Classroom or any other social media platforms on the techniques of tack welding and their conceptual understanding using a checklist.
 - ✓ Assess the learner's responses to SAMPLE SELF CHECK 3.6 uploaded in Google Classroom using a rubric.
 - ✓ Based on the rating level, provide necessary feedback and intervention.

E. Resources(online and offline):

- Competency-Based Learning Materials for Class X
- <https://youtu.be/auP9Yx27UpI> (Ways of performing tack welding)
- <https://www.thefabricator.com/thewelder/article/cuttingweldprep/how-to-perform-tack-welding-successfully> (Articles on tack welding)

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

Learning objectives	Core concepts(Chapters/Topic)
3.7.1 Define weld joint. 3.7.2 State the different types of welding joints. 3.7.3 State the different types of welding positions. 3.7.4 State the purpose of the keyhole. 3.7.5 Describe butt joint. 3.7.6 Weld butt joint in all positions 3.7.7 State the application of butt joint in all positions. 3.7.8 Weld butt joint in all positions 3.7.9 <i>Ensure proper handling of electrode and electrode holder.</i> 3.7.10 <i>Ensure appropriate use of PPE.</i>	3.7 Welding butt joint in all positions

B. Competencies:

- i. Weld butt joint in all positions for other purposes
- ii. Weld butt joint as per the standard procedure.

C. Pedagogy/learning experience

- **Contact:**
 - ✓ Let the learners read INFORMATION SHEET 3.7.
 - ✓ Share the following web links;
<https://youtu.be/MalgxMdd4x4>
https://youtu.be/_1cZxThSWxA
<https://youtu.be/8kbUZLuhrW8>
 - ✓ Demonstrate the techniques to weld the butt joint to the learners followed by group practice and individual practice.
 - ✓ Let the learners perform OPERATION SHEET 3.7.
 - ✓ Let the learners solve SAMPLE SELF CHECK 3.7.
- **Non-contact:**
 - ✓ Let the learners read INFORMATION SHEET 3.7 and OPERATION SHEET 3.7
 - ✓ Share the following web links;
<https://youtu.be/MalgxMdd4x4>
https://youtu.be/_1cZxThSWxA
<https://youtu.be/8kbUZLuhrW8> or other learning resources (Articles, online content, etc.)

- ✓ Based on the information obtained from the learning resources, let the learners develop a model (illustration) of weld joints using wood or any other available materials.
- ✓ Let the learners solve SAMPLE SELF CHECK 3.7.

D. Assessment

- **Contact:**

- ✓ Assess the learners' performance on OPERATION SHEET 3.7.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.7
- ✓ Provide necessary feedback and intervention based on the rating from the rubric.

- **Non-contact:**

- ✓ Assess the learner's ability to gather information and to relate the information to the model uploaded by the learners in the Google Classroom using rubrics/checklist and give necessary intervention.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.7 uploaded in Google Classroom or any other social media platforms.

E. Resources(online and offline):

- Competency-Based Learning Materials for Class X
- <https://youtu.be/MalgxMdd4x4> (Explanation on the types of weld joints)
- https://youtu.be/_1cZxThSWxA (Explanation on the different types of welding position)
- <https://youtu.be/8kbUZLuhrW8> (Explanation on the weld joints and their applications)

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

Learning objectives	Core concepts(Chapters/Topics)
3.8.1 Describe lap joint. 3.8.2 Explain the application of lap joint in all positions. 3.8.3 Weld lap joint in all positions 3.8.4 <i>Ensure proper handling of electrode and electrode holder.</i> 3.8.5 <i>Ensure appropriate use of PPE.</i>	3.8 Welding lap joint in all positions

B. Competencies:

- i. Weld lap joint in all positions.
- ii. Weld lap joint as per the standard procedure.

C. Pedagogy/learning experience

- **Contact:**
 - ✓ Let the learners read INFORMATION SHEET 3.8.
 - ✓ Share the web links <https://youtu.be/6A35U8zW0Pg> to know the techniques to weld the lap joint in all positions.
 - ✓ Demonstrate the techniques to weld the lap joint
 - ✓ Let the learners perform OPERATION SHEET 3.8 in a group followed by individual practice.
 - ✓ Let the learners solve SAMPLE SELF CHECK 3.8.
- **Non-contact:**
 - ✓ Let the learners read INFORMATION SHEET 3.8 and OPERATION SHEET 3.8.
 - ✓ Share the web link <https://youtu.be/6A35U8zW0Pg> to know the techniques to weld the lap joint in all positions.
 - ✓ Let the learners solve SAMPLE SELF CHECK 3.8.

D. Assessment

- **Contact:**
 - ✓ Assess the learners' performance on OPERATION SHEET 3.8
 - ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.8
 - ✓ Provide necessary intervention following the checklist.

- **Non-contact:**
 - ✓ Assess the learner's ability to gather information and to relate the information uploaded by the learners in the Google Classroom using rubrics/checklist and give necessary intervention.
 - ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.8 uploaded in Google Classroom or any other social media platforms.

E. Resources(online and offline):

- Competency-Based Learning Materials for Class X
- <https://youtu.be/6A35U8zW0Pg> (Explanation on how the lap joint is carried out)

MODULE 1: INTERPRETING ENGINEERING DRAWING

Chapter 2: Draw isometric and mechanical parts

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

Learning objectives	Core concepts (Chapters/Topics)
2.1.1 Define the scale of the drawing. 2.1.2 List types of scale. 2.1.3 Convert drawing scale 2.1.4 <i>Ensure clean and neatness of drawing.</i> 2.1.5 <i>Ensure Proper handling of drawing instruments.</i>	2.9 Converting drawing scale

B. Competencies:

- i. Convert the drawing scales as per the standard ratios.

C. Pedagogy/Learning experience

- **Contact:**
 - ✓ Let the learners read INFORMATION SHEET 2.1.
 - ✓ Let the learner searches for more information on engineering drawing scales from the web link https://bis.gov.in/other/WC_SP_46_03122014.pdf
 - ✓ Let the learners in a group discussion on the conversion of drawing scales required for standard ratios based on the information gathered.
 - ✓ Let the learners perform OPERATION SHEET 2.1.
 - ✓ Let the learners solve SAMPLE SELF CHECK 2.1.
- **Non-contact:**
 - ✓ Let the learners read INFORMATION SHEET 2.1.
 - ✓ Let the learner searches for more information on engineering drawing scales from the link https://bis.gov.in/other/WC_SP_46_03122014.pdf
 - ✓ Let the learners perform OPERATION SHEET 2.1.
 - ✓ Let the learners solve SAMPLE SELF CHECK 2.1.

D. Assessment

- **Contact:**
 - ✓ Assess the learner's ability to gather information discussed in the group.
 - ✓ Assess the learners' performance referring to OPERATION SHEET 2.1.
 - ✓ Assess the learners' responses to SAMPLE SELF CHECK 2.1.
 - ✓ Provide necessary feedback and intervention based on the rating from the rubric.

- **Non-contact:**
 - ✓ Assess learners' performance referring to OPERATION SHEET 2.1 uploaded in Google Classroom or any other social media platforms.
 - ✓ Assess the learners' responses to SAMPLE SELF CHECK 2.1 uploaded in Google Classroom or any other social media platforms.
 - ✓ Provide necessary feedback and intervention based on the rating from the rubric.

E. Resources(online and offline):

- Competency-Based Learning Materials for Class X
- https://bis.gov.in/other/WC_SP_46_03122014.pdf (Explanation on the engineering drawing scales)

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

Learning objectives	Core concepts(Chapters/Topics)
2.2.1 Define isometric drawing. 2.2.2 State isometric terminologies. 2.2.3 Draw Isometric blocks 2.2.4 <i>Ensure clean and neatness of drawing.</i> 2.2.5 <i>Ensure Proper handling of drawing instruments.</i>	2.10 Drawing Isometric blocks

B. Competencies:

- i. Draw isometric blocks as per the given dimension in standard procedures.
- ii. Interpret any mechanical parts into the 3D drawing.

C. Pedagogy/learning experience

• **Contact:**

- ✓ Let the learners read INFORMATION SHEET 2.2.
- ✓ Share the web link <https://youtu.be/c6DygJMwos8> to understand the techniques for drawing isometric blocks.
- ✓ The learners draw prepare a presentation using the information obtained from relevant sources.
- ✓ Let the learners make the presentation to the whole class.
- ✓ Let the learners perform OPERATION SHEET 2.2.
- ✓ Let the learners solve SAMPLE SELF CHECK 2.2

• **Non-contact:**

- ✓ Let the learners read INFORMATION SHEET 2.2.
- ✓ Share the web link <https://youtu.be/c6DygJMwos8> to understand the techniques for drawing isometric blocks.
- ✓ Let the learners watch the video and prepare a mind map and posts it in the Google Classroom.
- ✓ Let the learners perform OPERATION SHEET 2.2.
- ✓ Let the learners solve SAMPLE SELF CHECK 2.2

D. Assessment

• **Contact:**

- ✓ Assess the learner's conceptual understanding of the working mechanism of the respiratory system drawn in the form of a mind map, which is uploaded in the Google Classroom. Provide necessary intervention following the assessment of the mind map.
- ✓ Assess the learners' performance referring to OPERATION SHEET 2.2
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 2.2 uploaded in Google Classroom.

- **Non-contact:**
 - ✓ Assess the learners' responses to SAMPLE SELF CHECK 2.1 uploaded in Google Classroom or any other social media platforms.
 - ✓ Assess the learners' performance referring to OPERATION SHEET 2.2.
 - ✓ Assess the presentation prepared and uploaded by the learner in the Google Classroom to assess the learner's conceptual understanding of drawing isometric block. Provide necessary intervention based on the assessment of the presentation.

E. Resources(online and offline):

- Competency-Based Learning Materials for Class X
- <https://youtu.be/c6DygJMwos8> (Explanation on the tips of drawing isometric block)

A. Learning objectives/Broad Theme/Strand/Chapter/Topics:

Learning Objectives	Core concepts(Chapters/Topics)
2.3.1 Define orthographic drawing. 2.3.2 List the four quadrants. 2.3.3 State types of orthographic projections. 2.3.4 Differentiate between first and third angle projection. 2.3.5 Draw orthographic projection 2.3.6 <i>Ensure clean and neatness of drawing.</i> 2.3.7 <i>Ensure Proper handling of drawing instruments</i>	2.11 Drawing orthographic projection

B. Competencies:

- i. Draw orthographic projections as per the standard procedures and dimensions.

C. Pedagogy/Learning Experiences

• **Contact:**

- ✓ Conduct pre-assessment on drawing of 3-D shapes.
- ✓ Let the learners draw 3-D shapes on paper.
- ✓ Let the learners draw orthographic views from 3-D figures.
- ✓ Let the learners read INFORMATION 2.3.
- ✓ Share the web link <https://youtu.be/1sjaelzuGAK> to know basic orthographic projection.
- ✓ Provide structures (real objects) and make learners draw orthographic views.
- ✓ Provide isometric drawing and let learners draw an orthographic view.
- ✓ Let the learners solve OPERATION 2.3 and SAMPLE SELF CHECK 2.3
- ✓ Compile and assign question sets related to creating an orthographic drawing from the structure, orthographic drawing from isometric drawing and create 3-D shapes from the orthographic drawing.

• **Non-Contact:**

- ✓ Let the learners read INFORMATION 2.3.
- ✓ Share the web link <https://youtu.be/1sjaelzuGAK> to know basic orthographic projection.
- ✓ Provide isometric drawing and let learners draw an orthographic view.
- ✓ Let the learners solve OPERATION 2.3 and SAMPLE SELF CHECK 2.3
- ✓ Compile and assign question sets related to creating an orthographic drawing from the structure, orthographic drawing from isometric drawing and create 3D shapes from orthographic drawing and upload in Google Classroom.

D. Assessment

- **Contact:**
 - ✓ Monitor the pre-assessment carried out in the classroom.
 - ✓ Provide necessary intervention and feedback.
 - ✓ Assess the learners' responses to OPERATION SHEET 2.3 and SAMPLE SELF CHECK 2.3
 - ✓ Assess the learners' response to the additional question on orthographic views.
- **Non-contact:**
 - ✓ Assess the learners' responses to OPERATION SHEET 2.3 and SAMPLE SELF CHECK 2.3
 - ✓ Assess the learners' response to the additional question on orthographic views.

E. Resources (Online and offline):

- Competency-Based Learning Materials for Class XI
- <https://youtu.be/1sjaelzuGAK> (Explanation on orthographic projection)

RESOURCES

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