

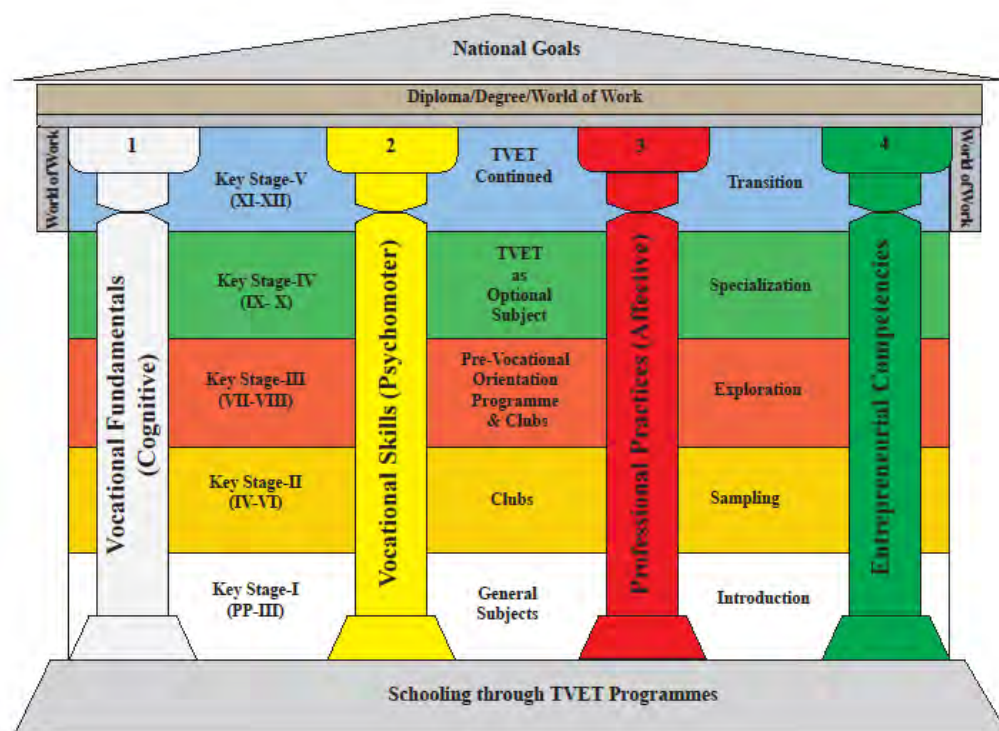
TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING (TVET)

NEW NORMAL CURRICULUM

INSTRUCTIONAL GUIDE

(PLUMBING)

CLASS: XI



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.

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Chapter 2: Installing pipes and fittings

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

Learning objectives	Core concepts (Chapters/Topics)
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</i> <i>Work in team</i>	2.13 Preparing layout

B. Competencies:

- i) Prepare layout as per the drawing.

C. Pedagogy/Learning Experiences

• Contact:

- ✓ 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 organize Group practices on OPERATION SHEET 2.13

• Non-contact:

- ✓ 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:

• Contact:

- ✓ 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.

- **Non-contact:**

- ✓ 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 (online and offline):

- Competency-Based Learning Materials for Classes IX and X, REC
- Handouts
- PPT

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

Learning objectives	Core concepts (Chapters/Topics)
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>	2.14 Cutting channel

B. Competencies

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

C. Pedagogy/Learning Experience

- **Contact:**
 - ✓ Lecture-based on 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 learner organize group practice on OPERATION SHEET 2.14.
- **Non-contact:**
 - ✓ 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:

- **Contact:**
 - ✓ 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.
- **Non-contact:**
 - ✓ 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 (online and offline):

- Competency-Based Learning Materials for Classes IX and X, REC
- <https://youtu.be/WtTJE6f33QY> (Explanation on the Cutting channel).
- <https://youtu.be/EQ085DcVDrc>(Explanation on cutting channel, watch till 1.20 mins)
- Handout

A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
2.15.1 Explain types of pipe laying and importance of trial fitting 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> <i>Ensure appropriate use of hand gloves and apron</i>	2.15 Laying water pipeline

B. Competencies

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

C. Pedagogy/Learning experience

- **Contact:**

- ✓ Brainstorm on the importance of laying water pipelines.
- ✓ Lecture-based on 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.

- **Non-contact:**

- ✓ 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

- **Contact:**

- ✓ 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.

- **Non-contact:**

- ✓ 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 (online and offline)

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

A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
2.16.1 Define clamp and dowel 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>	2.16 Fixing clamps

B. Competencies

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

C. Pedagogy/Learning experience

- **Contact:**
 - ✓ Lecture on Fix clamps
 - ✓ Make learners go through information 2.16 and Make learners go through OPERATION SHEET 2.16
 - ✓ Demonstration based on OPERATION SHEET 2.16
 - ✓ Provide guided Practices followed by practices individually.
- **Non-contact:**
 - ✓ Instruct learners to go through INFORMATION SHEET 2.16
 - ✓ Share the web link <https://youtu.be/quKV1iEypj0> which explains 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

- **Contact:**
 - ✓ Make learners read INFORMATION SHEET 2.16 and perform OPERATION SHEET 2.16 and keep on practicing while performing any task.
 - ✓ 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.

- **Non-contact:**
 - ✓ 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 (online and offline)

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

A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
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>	2.17 Conducting leak test

B. Competencies

- i) Conduct leakage tests as per job requirements.

C. Pedagogy/Learning experience

• Contact:

- ✓ 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.

• Non-contact

- ✓ 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

• Contact:

- ✓ 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.
- **Non-contact:**
 - ✓ 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 (online and offline)**
 - CBLM for Classes IX and X, REC
 - <https://youtu.be/M5pl2913bdc> (Explanation on conducting leakage)

A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
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>	2.18 Insulating pipe

B. Competencies

- i) Insulate pipe as per weather conditions.

C. Pedagogy/Learning experience

- **Contact:**
 - ✓ 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
- **Non-contact:**
 - ✓ Make learners go through INFORMATION SHEET 2.18 and OPERATION SHEET 2.18.
 - ✓ Share 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.
 - ✓ Provide PPT on the methods of insulation and types of insulating materials

D. Assessment

- **Contact:**
 - ✓ 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.
- **Non-contact:**
 - ✓ 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 (online and offline)

- CBLM for Classes IX and X, REC
- Handout
- PPT
- <https://youtu.be/XxbtIKW2-wU> (Explanation on the insulating pipe)

Chapter 3 Carry out basic masonry work

A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
<p>3.1.1 State the types of tools and their uses</p> <p>3.1.2 State the types of materials and their uses</p> <p>3.1.3 State the types of equipment and their uses</p> <p>3.1.4 Describe the importance of selecting appropriate tools, material, and equipment</p> <p>3.1.5 Explain the storage of materials</p> <p>3.1.6 Identify tools, equipment, and materials</p> <p>3.1.7 <i>Ensure proper handling of tools and equipment</i></p> <p>3.1.8 <i>Ensure good housekeeping</i></p> <p>3.1.9 <i>Ensure appropriate use of hand gloves and apron</i></p>	<p>3.1 Identifying tools and equipment</p>

B. Competencies

- i) Identify appropriate tools, materials, and equipment for any task.

C. Pedagogy/Learning experience

- **Contact:**
 - ✓ Lecture-based on OPERATION SHEET 3.1
 - ✓ Make go through INFORMATION SHEET 3.1.
 - ✓ Make learners go through OPERATION SHEET 3.1
 - ✓ Demonstrate on OPERATION SHEET 3.1
 - ✓ Provide guided practice to identify tools and equipment.
- **Non-contact:**
 - ✓ Make learners go through INFORMATION SHEET 3.1 and OPERATION SHEET 3.1.
 - ✓ Share the web link <https://youtu.be/Bwe7iffD01g> for further explanation on identifying tools and equipment. Instruct them to write handouts out of it in their notebook.
 - ✓ Provide handouts, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.

D. Assessment

- **Contact:**
 - ✓ Make learners solve SAMPLE SELF CHECK 3.1 and give additional questions from CBLM and other resources (from the links given above).
 - ✓ Conduct a test (quiz, true or false, puzzle or short answer type questions) through Kahoot.

- **Non-contact:**

- ✓ Make learners solve SAMPLE SELF CHECK 3.1 and give additional questions from CBLM and other resources (from the links given above) 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 (online and offline)

- CBLM for Classes IX and X, REC
- Handout
- <https://youtu.be/Bwe7iffD01g> (Identifying tools and equipment)

A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
3.2.1 Define layout and describe its purpose. 3.2.2 List the methods of the layout. 3.2.3 List the tools & materials required for laying the foundation. 3.2.4 Calculate using Pythagoras theorem to derive 3,4,5 method. 3.2.5 State the terminology used in the layout. 3.2.6 Explain the 3,4,5 method of foundation layout. 3.2.7 Use water level pipe. 3.2.8 Carryout foundation layout. 3.2.9 Prepare layout 3.2.10 <i>Work in team</i> 3.2.11 <i>Ensure correct interpretation of drawing</i>	3.2 Preparing layout

A. Competencies

- i) Prepare layout as per the job requirement.

B. Pedagogy/Learning experience

- **Contact:**
 - ✓ Make learners go through the INFORMATION SHEET 3.2.
 - ✓ Share the web link <https://youtu.be/XPbWIp56zxY> that shows the process of setting out.
 - ✓ Make learners go through and perform SKILL SHEET 3.2 on using water level pipe.
 - ✓ Make learners go through and perform OPERATION SHEET 3.2 on carrying out foundation layout in groups through guided practice.
 - ✓ Demonstrate how to prepare layout.
- **Non-contact:**
 - ✓ Make learners go through the INFORMATION SHEET 3.2 through Google Classroom.
 - ✓ Share the web link <https://youtu.be/XPbWIp56zxY> that shows the process of setting out
 - ✓ Make learners go through SKILL SHEET 3.2 on using water level pipe.
 - ✓ Make learners go through OPERATION SHEET 3.2 on carrying out foundation layout.

C. Assessment

- **Contact:**
 - ✓ Make learners perform OPERATION SHEET 3.2 and .keep on practicing while performing any task.

- ✓ Make learners answer the SAMPLE SELF CHECK 3.2 of CBLM with additional questions.
- ✓ Assess learners' performance using a rubric.
- **Non-contact:**
 - ✓ Instruct learners to answer the SAMPLE SELF CHECK 3.2 of CBLM with additional questions and send it through Google Classroom.
 - ✓ Written test through Kahoot.
 - ✓ Assess through oral/viva-voce

D. Resources (online and offline)

- CBLM for Classes IX and X, REC
- <https://youtu.be/XPbWIp56zxY> (Setting out)

A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
<p>3.4.1 State the different types of cement.</p> <p>3.4.2 State the different types of mix ratios.</p> <p>3.4.3 Explain the setting time of cement.</p> <p>3.4.4 List the method of measuring the ingredients.</p> <p>3.4.5 List the tools required for mixing.</p> <p>3.4.6 Calculate the total quantity of mortar.</p> <p>3.4.7 Mix mortar manually.</p> <p>3.4.8 <i>Ensure proper handling of tools and materials.</i></p> <p>3.4.9 <i>Ensure appropriate use of hand gloves, goggles, apron, and helmet.</i></p>	<p>3.3 Mixing mortar</p>

B. Competencies

- i) Mix mortar as per the prescribed ratio.

C. Pedagogy/Learning experience

• Contact:

- ✓ Make learners go through the INFORMATION SHEET 3.4.
- ✓ Share the web link <https://www.fixmyroof.co.uk/mix-cement-mortar/> that shows the mixing of cement and sand.
- ✓ Share the web link https://www.dcc1.bt/?page_id=95 that explains the types of cement.
- ✓ Share the web link <https://civiltoday.com/civil-engineering-materials/mortar/65-types-of-mortar> that shows the types of mortar.
- ✓ Provide the questions to calculate the total quantity of mortar for brickwork, stonework, and plastering work.
- ✓ Make learners perform OPERATION SHEET 3.4.

• Non-contact:

- ✓ Make learners go through the INFORMATION SHEET 3.4.
- ✓ Share the web link <https://www.fixmyroof.co.uk/mix-cement-mortar/> and instruct them to read the notes and watch the video that shows the mixing of cement and sand.
- ✓ Share the link https://www.dcc1.bt/?page_id=95 that explains the types of cement.
- ✓ Make learners go through the notes from the web link <https://civiltoday.com/civil-engineering-materials/mortar/65-types-of-mortar> that shows the types of mortar.
- ✓ Provide the questions to calculate the total quantity of mortar for brickwork, stonework, and plastering work and send it through Google Classroom.

D. Assessment

- **Contact:**

- ✓ Make the learners read INFORMATION SHEET 3.4 make learners perform OPERATION SHEET 3.4.
- ✓ Make learners solve the SAMPLE SELF CHECK 3.4.
- ✓ Assess learners' performance using a proper rubric.

- **Non-contact:**

- ✓ Instruct learners to solve the SAMPLE SELF CHECK 3.4 and submit 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 (online and offline)

- CBLM for Classes IX and X, REC
- <https://www.fixmyroof.co.uk/mix-cement-mortar/>
- https://www.dcc1.bt/?page_id=95 (Types of cement)
- <https://civiltoday.com/civil-engineering-materials/mortar/65-types-of-mortar> (Mixing mortar)

A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
3.5.1 Define concrete. 3.5.2 Types of concrete mixing. 3.5.3 Method of transportation of concrete. 3.5.4 Method of curing concrete. 3.5.5 Mix concrete. 3.5.6 <i>Ensure proper handling of the mixer machine.</i> 3.5.7 <i>Ensure to use hand gloves, earmuff.</i>	3.4 Mixing concrete

B. Competencies

- i) Mix concrete maintaining water-cement ratio uniformly

C. Pedagogy/Learning experience

- **Contact:**
 - ✓ Lecture on the method of transportation of concrete.
 - ✓ Make learners go through the INFORMATION SHEET 3.5
 - ✓ Share the web link <https://youtu.be/IDuSLAtpFVE> that explains the mixing of concrete.
 - ✓ Share the web link <https://youtu.be/ZOfpI5DgMry> that shows methods of curing.
 - ✓ Make learners perform OPERATION SHEET 3.5 in the group.
- **Non-contact:**
 - ✓ Make learners go through the INFORMATION SHEET 3.5 from CBLM.
 - ✓ Provide PPT on the method of transportation of concrete.
 - ✓ Make learners watch the link <https://youtu.be/IDuSLAtpFVE> that explains the mixing of concrete.
 - ✓ Make learners watch the web link <https://youtu.be/ZOfpI5DgMry> that shows methods of curing.

D. Assessment

- **Contact:**
 - ✓ Make learners read INFORMATION SHEET 3.5 and perform OPERATION SHEET 3.5 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 3.5
 - ✓ Assess learners through oral
- **Non-contact:**
 - ✓ Instruct learners to solve the SAMPLE SELF CHECK 3.5 and submit 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 (online and offline)

- CBLM for Classes IX and X, REC
- PPT
- <https://youtu.be/IDuSLAtpFVE> (Explanation on the insulating pipe mixing concrete)
- <https://youtu.be/ZOfpI5DgMry> (Explanation on the insulating pipe n methods of curing)

A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
3.6.1 List the types of bonds. 3.6.2 Differentiate between the bonded and un-bonded wall. 3.6.3 Describe the orientation of bricks. 3.6.4 Define the stretcher bond. 3.6.5 State the application of stretcher bond. 3.6.6 Explain the technical terms for brick masonry. 3.6.7 Calculate the quantity of bricks 3.6.8 Lay stretcher bond wall.	3.5 Laying stretcher bond

B. Competencies

- i) Lay stretcher bond wall as per job requirement.

C. Pedagogy/Learning experience

- **Contact:**

- ✓ Make learners go through the INFORMATION SHEET 3.6.
- ✓ Make a quiz via Kahoot or Nearpod on the orientation of brick, stretcher bond wall, and technical terms used in brick masonry.
- ✓ Provide learners with the questions to calculate the quantity of bricks required for different volumes of a wall.
- ✓ Make learners go through and perform OPERATION SHEET 3.6 on laying a stretcher bond wall through demonstration.

- **Non-contact:**

- ✓ Make learners go through the INFORMATION SHEET 3.6.
- ✓ Make learners go through OPERATION SHEET 3.6.
- ✓ Provide PPT to calculate the quantity of bricks required for different volumes of a wall.
- ✓ Share the web link <https://youtu.be/qZGOYS2qteQ> which explains the stretcher bond wall through Google Classroom.

D. Assessment

- **Contact:**

- ✓ Make learners read INFORMATION SHEET 3.6 and perform OPERATION SHEET 3.6 and assess them using a checklist/performance guide.
- ✓ Make learners to perform OPERATION SHEET 3.6.
- ✓ Assess their performance using the rubric.
- ✓ Make learners answer the SAMPLE SELF CHECK 3.

- **Non-contact:**

- ✓ Make learners answer the SAMPLE SELF CHECK 3.6 and send it through Google Classroom.

- ✓ Conduct a quiz via Kahoot or Nearpod on the orientation of brick, stretcher bond wall, and technical terms used in brick masonry through Google Classroom.
- ✓ Provide learners with the questions to calculate the quantity of bricks required for different volumes of a wall and instruct them to send it through Google Classroom.

E. Resources (online and offline)

- CBLM for Classes IX and X, REC
- PPT
- <https://youtu.be/qZGOYS2qteQ> (Laying stretcher bond wall)

A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
4.5.1 Define English bond. 4.5.2 State the advantage of English bond. 4.5.3 State the application of English bond. 4.5.4 Lay English bond. 4.5.5 <i>Ensure proper handling of hand tools.</i> 4.5.6 <i>Ensure appropriate use of PPE.</i>	3.6 Laying English bond

C. Competencies

- i) Lay English bond wall as required.

F. Pedagogy/Learning Experiences

- **Contact:**

- ✓ Make learners go through INFORMATION SHEET 3.7.
- ✓ Share the web link <https://www.civillead.com/difference-between-english-bond-and-flemish-bond/> which explains on the English bond wall.
- ✓ Share the web link <https://youtu.be/A2ST12dqX8U> for further explanation on the construction of the English bond wall.
- ✓ Make learners go through and perform OPERATION SHEET 3.7 through guided practice.

- **Non-contact:**

- ✓ Make learners go through INFORMATION SHEET 3.7.
- ✓ Share the web link <https://www.civillead.com/difference-between-english-bond-and-flemish-bond/> which explains the construction of the English bond wall.
- ✓ Make learners watch a video from the web link <https://youtu.be/A2ST12dqX8U> on the construction of the English bond wall through Google Classroom.
- ✓ Make learners go through OPERATION SHEET 3.7 through Google Classroom.

G. Assessment:

- **Contact:**

- ✓ Assess learners' ability to construct the English bond wall using a rubric.
- ✓ Ask learners to solve the SAMPLE SELF CHECK 3.7 of CBLM.

- **Non-contact:**

- ✓ Make learners go through OPERATION SHEET 4.5 through Google Classroom.
- ✓ Ask learners to solve the SAMPLE SELF CHECK 4.5 and send it through Google Classroom.

H. Resources (online and offline):

- CBLM for Classes IX and X, REC
- <https://www.civillead.com/difference-between-english-bond-and-flemish-bond/> (Note on English bond wall)
- <https://youtu.be/A2ST12dqX8U> (Video on English bond wall construction)

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

Learning objectives	Core concepts (Chapters/Topics)
3.8.1 Define the header bond. 3.8.2 State the application of the header bond. 3.8.3 Define a Flemish bond. 3.8.4 State the application of Flemish bond. 3.8.5 Differentiate between English and Flemish bond wall. 3.8.6 Lay header and Flemish bond. 3.8.7 <i>Ensure proper handling of hand tools.</i> 3.8.8 <i>Ensure appropriate use of PPE.</i> 3.8.9 <i>Ensure to maintain cleanliness at the workplace.</i> 3.8.10 <i>Ensure to use materials economically.</i> 3.8.11 <i>Ensure proper storage of surplus materials.</i>	3.7 Laying header and Flemish bond

F. Competencies

- i) Construct header and Flemish bond wall as required.

G. Pedagogy/Learning Experience

- **Contact:**
 - ✓ Make the learners read INFORMATION SHEET 3.8 and OPERATION SHEET 3.8
 - ✓ Demonstrate on constructing header and Flemish bond wall.
 - ✓ Make learners perform OPERATION SHEET 3.8.
 - ✓ Provide handout to learners on the application on the Flemish bond wall.
- **Non-contact:**
 - ✓ Make learners go through INFORMATION SHEET 3.8 through Google Classroom.
 - ✓ Share the web link <http://www.civilprojectsonline.com/civil-projects/types-of-bonds-in-brickwork-stretcher-and-header-bond/> which explains on the comparison between English and Flemish bond wall through Google Classroom.
 - ✓ Share the web link https://youtu.be/c6If_46zMOM which explains on header bond wall through Google Classroom.
 - ✓ Share the web link <https://youtu.be/BKKpCmiBtzk> which explains on the Flemish bond wall through Google Classroom.
 - ✓ Ask learners to read OPERATION SHEET 3.8 through Google Classroom.

H. Assessment:

- **Contact:**
 - ✓ Make learners read INFORMATION SHEET 3.8 and perform OPERATION SHEET 3.8 and assess them using a checklist/performance guide. Provide necessary intervention.
 - ✓ Assess learner's knowledge about the application on the Flemish bond wall by asking questions.
 - ✓ Conduct class tests to assess their understanding.
 - ✓ Let learners carry out activities of the SAMPLE SELF CHECK 3.8

- ✓ Let the learners do the presentation and assess as per the rubric developed.
- **Non-contact:**
 - ✓ Make learners read INFORMATION SHEET 3.8 and perform OPERATION SHEET 3.8 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 3.8 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

I. Resources (online and offline):

- CBLM, REC
- Handout
- <https://www.civillead.com/difference-between-english-bond-and-flemish-bond/>
(English bond vs Flemish bond)
- https://youtu.be/c6If_46zMOM (Video on header bond wall)
- <https://youtu.be/BKKpCmiBtzk> (Video on Flemish bond wall)

A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
3.6.1 Define stone masonry. 3.6.2 Define stone dressing 3.6.3 State the Technical terms used in stone masonry 3.6.4 List the tools used for stone dressing 3.6.5 Explain the purpose of stone dressing 3.6.6 State the uses of stone masonry. 3.6.7 List the types of stone used in building construction. 3.6.8 Describe the types of stone masonry. 3.6.9 Describe the quality and selection of stone. 3.6.10 Apply basic estimation 3.8.11 Lay stone wall	3.8 Laying stone wall

B. Competencies

- i) Prepare mortar as per required.

C. Pedagogy/Learning experience

- **Contact:**
 - ✓ Make learners go through INFORMATION SHEET 3.8 and OPERATION SHEET 3.8
 - ✓ Lecture on the purpose of stone dressing.
 - ✓ Share the web link <https://youtu.be/mtQChQXKrkA> which explains how to lay a stone wall.
 - ✓ Demonstrate how to lay a stone wall.
 - ✓ Provide guided Practices.
- **Non-contact:**
 - ✓ Make learners go through INFORMATION SHEET 3.8 and learners go through OPERATION SHEET 3.8.
 - ✓ Share the web link <https://youtu.be/mtQChQXKrkA> which explains how to lay a stone wall.
 - ✓ Provide a handout on the type of stone used in building construction.
 - ✓ Provide PPT on tools used for stone dressing and the purpose of stone dressing through Camtasia.

D. Assessment

- **Contact:**

- ✓ Make learners read INFORMATION SHEET 3.8 and perform OPERATION SHEET 3.8 and keep on practicing while performing any task.
- ✓ Make learners solve the SAMPLE SELF CHECK 3.8
- ✓ Assess the learner's ability through conducting oral tests/ written tests.

- **Non-contact:**

- ✓ Make learners solve the SAMPLE SELF CHECK 3.8 from CBLM 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 (online and offline)

- CBLM for Classes, REC
- <https://youtu.be/mtOChOXKrKA> (Explanation on laying stone wall)
- Video demonstrating the preparation of the mortar.
- PPT

ENGINEERING DRAWING

A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
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>	2.3 Drawing orthographic projection

B. Competencies

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

C. Pedagogy/Learning experience

- **Contact:**

- ✓ Make learners read INFORMATION SHEET 2.3
- ✓ Make learners read and perform OPERATION SHEET 2.3.
- ✓ Make learners solve the SAMPLE SELF CHECK 2.2 and provide additional questions on drawing an orthographic projection.

- **Non-contact**

- ✓ 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> that 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

- **Contact:**

- ✓ 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.

- **Non-contact:**

- ✓ Assess learners' response to SAMPLE SELF CHECK 2.3 and the additional questions provided.

✓ Provide feedback through Google Classroom.

E. Resources (online and offline)

- CBLM for Classes IX and X, REC
- <https://youtu.be/1sjaelzuGAk> (Basics of orthographic projection)
- <https://youtu.be/Gees6d2ANzs> / <https://youtu.be/sC8-IvJpBaA> (Difference between the first angle and third angle projection)

A. Learning objectives/Broad theme/Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
2.3.1 Define building drawing. 2.3.2 List the types of building drawing. 2.3.3 Define the scale for drawing. 2.3.4 List the types of scale. 2.3.5 Draw a simple building plan. 2.3.6 Develop creativity through their simple drawing plan. 2.3.7 <i>Ensure proper handling of drawing instruments.</i> 2.3.8 <i>Ensure proper disposal of waste.</i>	2.4 Draw a simple building plan

B. Competencies

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

C. Pedagogy/Learning experience

• Contact:

- ✓ 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.

• Non-contact

- ✓ 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

• Contact:

- ✓ 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.

• Non-contact:

- ✓ 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 (online and offline)

- CBLM for Classes XI and XII, REC
- <https://youtu.be/VYiVjVulnm4> (How to draw a floor plan)

RESOURCES

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