National School Curriculum

INSTRUCTIONAL GUIDE FOR TVET (WELDING)

CLASSES IX & X

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

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

- His Majesty Jigme Khesar Namgyel Wangchuck

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Foreword

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

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

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

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

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

Tashi Namgyel
Director

Introduction

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

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

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

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

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

Purpose of the Instructional Guide

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

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

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

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

designing lesson plans and teaching learning activities, teachers need to ensure that the materials are relevant and appropriate for the given task.

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

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CLASS IX

MODULE 1: CARRYING OUT SHIELDED METAL ARC WELDING (SMAW)

Chapter 1: Practising Occupational Health and Safety (OHS) and workshop safety

A. Competency/Competencies:

i. Practise OHS procedures in any task for safety

B. Learning objectives/Topic:

Learning objectives	Topic
1.1.1 Define 5S. 1.1.2 State the purposes of 5S. 1.1.3 Explain the principles of 5S 1.1.4 Define OHS. 1.1.5 State the importance of OHS. 1.1.6 Explain the rights of the employee. 1.1.7 State the main causes of accidents. 1.1.8 Explain the safety rules. 1.1.9 Apply Principles of 5S 1.1.10 *Ensure appropriate use of PPE* 1.1.11 *Ensure to refer OHS manual*	**1.1 Applying principles of 5S** **Overview:** The topic is about the ways of organizing and managing the workplace that enable the learners to perform their tasks effectively and efficiently.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 1.1 of CBLM.
- ✓ Share the web link https://youtu.be/n9sxq34D9HQ that explains the principles of 5S.
- ✓ Provide handouts to learners.
- ✓ Let learners perform OPERATION SHEET 1.1 of CBLM.
- ✓ Let learners solve SAMPLE SELF CHECK 1.1.
- ✓ Instruct learners to read INFORMATION SHEET 1.1 and perform OPERATION SHEET 1.1 of CBLM for classes IX through Google Classroom. (The learners may arrange available tools and materials at home)
- ✓ Provide handouts to learners through Google Classroom or any other social media platforms.
- ✓ Share the web link https://youtu.be/n9sxq34D9HQ that explains the principles of 5S.
- ✓ Let learners solve SAMPLE SELF CHECK 1.1 and provide additional questions referring to CBLM.

D. Assessment:

- ✓ Assess the learners' performance referring to OPERATION SHEET 1.1 and their conceptual understanding of 5S looking at their performance using rubrics
- ✓ Assess the responses of the SAMPLE SELF CHECK 1.1 and given additional questions.

- ✓ Assess the short video sent by the learner in the Google Classroom or any other social media platforms using the OPERATION SHEET 1.1.
- ✓ Assess the learners' responses to the SAMPLE SELF CHECK 1.1 uploaded through Google Classroom or any other social media platforms.

E. Resources:

- ✓ CBLM
- ✓ PPT Handouts
- ✓ https://youtu.be/n9sxq34D9HQ (Explanation on principles of 5S)

A. Competency/Competencies:

i. Practise OHS procedures in any task for safety
ii. Use appropriate PPE in every task.

B. Learning objectives/Topic:

Learning objectives	Topic
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 Personal Protective Equipment (PPE) 1.2.5 *Ensure to use appropriate PPE.* 1.2.6 *Ensure safe disposal of damaged PPE.* 1.2.7 *Ensure not to use defective and damaged PPE*	**1.2 Using Personal Protective Equipment (PPE)** **Overview:** The topic is about the proper use of various PPE and it helps the learners to maintain safety at workplace.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 1.2.
- ✓ Let learners read and perform OPERATION SHEET 1.2
- ✓ Let learners solve SAMPLE SELF CHECK 1.1 and provide additional questions referring to CBLM.
- ✓ Instruct the learners to read INFORMATION SHEET 1.2 and OPERATION SHEET 1.2.
- ✓ Share the web link https://youtu.be/r9vp1q1L2ro that explains the PPE.
- ✓ Let learners solve SAMPLE SELF CHECK 1.1 and provide additional questions referring to CBLM in Google Classroom.

D. Assessment:

- ✓ Assess learners' ability to understand the usage of PPE while performing OPERATION SHEET 1.2.
- ✓ Assess the responses of the SAMPLE SELF CHECK 1.2 uploaded through Google Classroom.
- ✓ Assess the responses of the SAMPLE SELF CHECK 1.2 and the given additional questions sent through Google Classroom or any other social media platforms.

E. Resources:

- ✓ CBLM
- ✓ https://youtu.be/r9vp1q1L2ro **(**Explains PPE**)**

A. Competency/Competencies:

i. Maintain the workplace and personal safety as per the OHS standard.

B. Learning objectives/Topic:

Learning objectives		**Topic**
1.3.1	Define safety precaution.	**1.3 Maintaining workplace and personal safety** **Overview:** The learners can maintain a workplace and personal safety knowing about safety signs and symbols and ways of setting conducive workshop.
1.3.2	List the different types of safety.	
1.3.3	Explain workshop and personal safety.	
1.3.4	State the importance of maintaining a workplace and personal safety.	
1.3.5	Explain the importance of safety signs and symbols.	
1.3.6	Explain the emergency exit.	
1.3.7	Describe the layout of the workshop.	
1.3.8	Maintain workplace and personal safety	
1.3.9	*Ensure to follow OHS procedures.*	
1.3.10	*Ensure to keep the workshop clean.*	
1.3.11	*Ensure to ring the alarm bell before the accident spreads over.*	
1.3.12	*Ensure to display safety signs and symbols.*	
1.3.13	*Ensure to use appropriate PPE in the workplace.*	
1.3.14	*Ensure to avoid horseplay at the workplace.*	

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 1.3
- ✓ Let learners read and perform the OPERATION SHEET 1.3
- ✓ Let learners solve SAMPLE SELF CHECK 1.1 and provide additional questions referring to CBLM
- ✓ Instruct the learners to read INFORMATION SHEET 1.3 and OPERATION SHEET 1.3 through Google Classroom.
- ✓ Share the web link https://www.youtube.com/watch?v=4bkr5lpKGUM and https://www.youtube.com/watch?v=WW0U6o1XNec to explore the information on maintaining a workplace and personal safety.
- ✓ Let learners solve SAMPLE SELF CHECK 1.1 and provide additional questions referring to CBLM and upload in Google Classroom.

D. Assessment:

- ✓ Assess learners' ability to apply appropriate workplace and personal safety using rubrics
- ✓ Assess the learners' responses to the SAMPLE SELF CHECK 1.3 and the given additional questions.
- ✓ Assess the learners' response to SAMPLE SELF CHECK 1.3 and additional questions uploaded through Google Classroom.
- ✓ Conduct viva test through Zoom, Meet, or any other social platforms and assess their conceptual understanding on maintaining a workplace and personal safety.

E. Resources:

- ✓ CBLM
- ✓ https://www.youtube.com/watch?v=4bkr5lpKGUM (Explanation on workplace safety)
- ✓ https://www.youtube.com/watch?v=WW0U6o1XNec (Explanation on safety tips)

A. Competency/Competencies:

i. Maintain hand tools and portable power tools for better performance
ii. Maintain the tools and equipment to increase the efficiency.

B. Learning objectives/Topic:

Learning objectives	Topic
1.2.1 Explain tools and equipment safety 1.2.2 State the importance of maintaining tools and equipment safety. 1.2.3 List the dos and don'ts of tools and equipment. 1.2.4 Maintain tools and equipment safety	**1.4 Maintaining tools and equipment safety** **Overview:** The topic covers information on the ways of maintaining tools and equipment safety thereby increasing the

1.2.5 *Ensure all the tools are in workable condition.* 1.2.6 *Ensure to keep tools clean and dry, and store them properly after use.* 1.2.7 *Ensure to operate the machine when instructed.* 1.2.8 *Ensure to refer manual before operation of tools and equipment.*	efficiency of tools and equipment.

C. Learning Experiences:

- ✓ Let learners read the INFORMATION SHEET 1.4
- ✓ Share the web link http://www.ehsdb.com/dos-and-donts--hand-tools-equipments.php to supplement the tools and equipment safety.
- ✓ Let learners in a peer discuss Do's and Don'ts for tools and equipment and present to the whole class.
- ✓ Let learners perform OPERATION SHEET 1.4 on maintaining tools and equipment safety.
- ✓ Let learners solve SAMPLE SELF CHECK 1.4.
- ✓ Let learners read the INFORMATION SHEET 1.4 and OPERATION SHEET 1.4.
- ✓ Share the web link http://www.ehsdb.com/dos-and-donts--hand-tools-equipments.php that shows additional DOs and DON'Ts of hand tools.
- ✓ Instruct learners to watch a video on the web link https://youtu.be/jovscTSq-mg on the tools and equipment safety shared in Google Classroom.
- ✓ Let learners solve SAMPLE SELF CHECK 1.4.

D. Assessment:

- ✓ During the peer presentation, Let learners provide constructive feedback among themselves.
- ✓ Assess the learners' ability to maintain tools and equipment safety using a rubric.
- ✓ Assess the learners' responses on SAMPLE SELF CHECK 1.4 and the given additional questions.
- ✓ Assess the learners' responses on SAMPLE SELF CHECK 1.4 and additional questions uploaded through Google Classroom.

E. Resources:

- ✓ CBLM
- ✓ http://www.ehsdb.com/dos-and-donts--hand-tools-equipments.php (Articles on Dos and Don'ts of hand tools)
- ✓ https://youtu.be/jovscTSq-mg (Explanations on tools and equipment safety)

A. Competency/Competencies:

i. Operate and use different fire extinguishers to combat different classes of fires.

B. Learning objectives/Broad theme/Chapters/Topics:

Learning objectives	Topic
1.2.1 Define fire extinguisher. 1.2.2 Label the parts of a fire extinguisher. 1.2.3 Explain types/classes of fire. 1.2.4 List the types of fire extinguishers. 1.2.5 State the methods of combating/extinguishing fires. 1.2.6 Use fire extinguisher 1.2.7 *Ensure to read the instructions provided on the fire extinguisher.* 1.2.8 *Ensure appropriate use of PPE.*	**1.5 Using fire extinguisher** **Overview:** The use of different fire extinguishers are covered and it enables the learners to operate them appropriately.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 1.5
- ✓ Let learners read the procedures of OPERATION SHEET 1.5 step by step while the instructor demonstrates the procedure to combat the fire.
- ✓ Let learners in a group practice followed by individual practice.
- ✓ Share the web link https://www.youtube.com/watch?v=PQV71INDaqY to explore the methods on how to use the fire extinguisher to combat a fire.
- ✓ Let learners solve SAMPLE SELF CHECK 1.5.
- ✓ Let learners read INFORMATION SHEET 1.5
- ✓ Share the web link https://www.youtube.com/watch?v=PQV71INDaqY to explore the methods on how to use the fire extinguisher to combat a fire.
- ✓ Let learners solve SAMPLE SELF CHECK 1.5.

D. Assessment:

- ✓ Assess learners' conceptual understanding of fire extinguishers by conducting quizzes in the class.
- ✓ Assess the learners' performance on OPERATION SHEET 1.5 and provide guided practice while performing in groups and individually.
- ✓ Assess the learners' responses to the SAMPLE SELF CHECK 1.5.
- ✓ Assess the learners' conceptual understanding of fire extinguishers by conducting quiz in the Google Classroom
- ✓ Assess the learners' responses to the SAMPLE SELF CHECK 1.5 uploaded in Google Classroom.

E. Resources:

- ✓ CBLM
- ✓ https://www.youtube.com/watch?v=PQV71INDaqY (Explanation on methods to combat fire)

Chapter 2: Performing setup for SMAW

A. Competency/Competencies:

i. Prepare base metal as per the requirement.

B. Learning objectives/Topic:

Learning objectives	Topic
2.1.1 Explain the introduction to welding 2.1.2 Explain the scopes and market trend of welder 2.1.3 Safety aspects of welding 2.1.4 Identify the types of base metal and its properties 2.1.5 Describe the weld ability of metal 2.1.6 Explain the basic bench fitting 2.1.7 Explain the types of edge preparation and its importance 2.1.8 Identify the types of marking and measuring tools 2.1.9 Explain the purpose and method of cleaning 2.1.10 *Ensure appropriate use of PPE* 2.1.11 *Ensure to follow OHS rules and regulations*	**2.1 Preparing base metal** **Overview:** Besides knowing about the welding, the learners can acquire the scope of the welding.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 2.1.
- ✓ Let learners perform OPERATION SHEET 2.1.
- ✓ Let learners solve SAMPLE SELF CHECK 2.1.

D. Assessment:

- ✓ Assess the learners' performance on OPERATION SHEET 2.1
- ✓ Assess the learners' responses on SAMPLE SELF CHECK 2.1.

E. Resources:

- ✓ CBLM
- ✓ Handouts

A. Competency/Competencies:

i. Carry out arc welding for any task

ii. Set up arc welding machines are as per the job requirement.

B. Learning objectives/Topic:

Learning Objectives	Topic
2.2.1 Define explain the basic electrical connections 2.2.2 Explain the electrical phases 2.2.3 Explain the power source of SMAW(AC/DC) 2.2.4 Explain the constructional features of SMAW machine 2.2.5 List the advantages and limitations of SMAW 2.2.6 State the application of SMAW 2.2.7 Identify the specification of welding cable 2.2.8 Identify the specification of SMAW machine *2.2.9 Use spanner/wrench.* *2.2.10 Ensure appropriate use of PPE.* *2.2.11 Ensure the main supply switch and the machine are properly earthed.* *2.2.12 Ensure to safeguard against work hazards.*	**2.2 Setting up SMAW machine** **Overview:** The technique to connect the welding to achieve a good weld bead can be learnt besides related information on setup of welding machine.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 2.2.
- ✓ Demonstrate the use of spanner or wrench referring to SKILL SHEET 2.2.
- ✓ Demonstrate the setup of the arc welding machine to the learners referring to the OPERATION SHEET 2.2.
- ✓ Let learners perform SKILL SHEET 2.2 AND OPERATION SHEET 2.2.
- ✓ Let learners solve SAMPLE SELF CHECK 2.2.
- ✓ Let learners read INFORMATION SHEET 2.2, SKILL SHEET 2.2, and OPERATION SHEET 2.2.
- ✓ Share the web link https://youtu.be/QZdY3ZRY9RA to understand the parts of welding setup and basic connections.
- ✓ Let learners solve SAMPLE SELF CHECK 2.2.

D. Assessment:

- ✓ Assess the learners' performance on SKILL SHEET 2.2 and OPERATION SHEET 2.2 using Checklist.
- ✓ Assess the learners' responses on SAMPLE SELF CHECK 2.2
- ✓ Assess the learners' conceptual understanding of the working principle of welding machines by conducting the online test.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 2.2 uploaded in Google Classroom.

E. Resources:

- ✓ CBLM
- ✓ https://youtu.be/QZdY3ZRY9RA (Shows the parts of welding set up and basic connections).

A. Competency/Competencies:

i. Set up base metal as per the standard procedure**.**

B. Learning objectives/Topic:

Learning objectives	Topic
2.3.1 Define tack weld 2.3.2 Explain the purpose of tack welding 2.3.3 Describe the sequence of tack welding 2.3.4 Explain the root gap and its importance *2.3.5 Have work ethics and integrity* *2.3.6 Ensure appropriate use of PPE.* *2.3.7 Ensure the electrode holder does not contact with earth cable when the machine is in ON mode.*	**2.2 Setting up base metal** **Overview:** The topic covers the importance of tack weld and the root gap.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 2.3
- ✓ 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 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 learners perform OPERATION SHEET 2.3
- ✓ Let learners solve SAMPLE SELFCHEVK 2.3.

D. Assessment:

- ✓ 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 2.3.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 2.3.

E. Resources:

- ✓ CBLM
- ✓ 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)

Chapter 3: Performing SMAW on plate

A. Competency/Competencies:

i. Perform stringer bead in flat position.

B. Learning objectives/Topic:

Learning objectives	Topic
3.1.1 Define stringer bead 3.1.2 State the application of stringer bead 3.1.3 Explain different types of arc length and its effects 3.1.4 Explain the methods of striking an arc 3.1.5 Explain the correct selection of welding parameters 3.1.6 Explain the coding of electrode 3.1.7 Explain the construction of electrode 3.1.8 Explain the importance of electrode baking *3.1.9 Ensure safe handling of tools, materials, and equipment.* *3.1.10 Ensure proper disposal of waste material.* *3.1.11 Ensure appropriate use of PPE.*	**3.1 Performing stringer bead in flat position** **Overview:** The learners can select electrode and carry out the welding.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 3.1.
- ✓ Share the web links https://youtu.be/AU9KEKJ2tVI and https://youtu.be/KHDDtFgF2YU to understand more on types of arc length and methods to produce an electric arc.
- ✓ Share web links https://youtu.be/cQqsWpgtgMI and https://youtu.be/gAyceJb5OWc to understand more on electrode coding and welding symbols.
- ✓ Demonstrate maintaining arc length referring to OPERATION SHEET 3.3.
- ✓ Let learners perform OPERATION SHEET 3.1
- ✓ Let learners solve SAMPLE SELF CHECK 3.1.

D. Assessment:

- ✓ Assess the learners' performance referring to OPERATION SHEET 3.1.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.1.

E. Resources:

- ✓ CBLM
- ✓ https://youtu.be/AU9KEKJ2tVI (Types of arc length)
- ✓ https://youtu.be/KHDDtFgF2YU (Methods to produce an electric arc)
- ✓ https://youtu.be/cQqsWpgtgMI (Electrode coding)
- ✓ https://youtu.be/gAyceJb5OWc (Welding symbol)

A. Competency/Competencies:

i. Perform weaving bead in flat position.

B. Learning objectives/Topic:

Learning objectives	Topic
3.2.1 Define weaving bead 3.2.2 Explain the purpose of weaving bead 3.2.3 State the types of weaving technique	**3.2 Performing weaving bead in flat position** **Overview:** The topic covers the definition of weaving bead, its purposes and types. The learners can perform the weaving bead.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 3.2.
- ✓ Share the web link https://www.weldersuniverse.com/welding-beads/ to explore information on two types of welding beads.
- ✓ Demonstrate OPERATION SHEET 3.2.
- ✓ Let learners perform OPERATION SHEET 3.2
- ✓ Let learners read INFORMATION SHEET 3.2.
- ✓ Let learners solve SAMPLE SELF CHECK 3.2.

D. Assessment:

- ✓ Assess the learners' performance referring to OPERATION SHEET 3.2
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.2.

E. Resources:

- ✓ CBLM
- ✓ https://www.weldersuniverse.com/welding-beads/ to explore (Types of welding beads)

A. Competency/Competencies:

i. Perform fillet weld in flat position(1F)

B. Learning objectives/Topic:

Learning objectives	Topic
3.3.1 Define fillet weld 3.3.2 State the different types of welding position 3.3.3 Identify welding symbols 3.3.4 Explain the nomenclature of the fillet weld 3.3.5 Explain the application of fillet weld in flat position 3.3.6 Explain the correct selection of parameters in SMAW for 1F position 3.3.7 State the types of weld 3.3.8 Explain the types of weld joint 3.3.9 Explain the importance of pre-heating and post-heating 3.3.10 Explain the importance of maintaining inter-pass temperature 3.3.11 Explain the distortion prevention method 3.3.12 Explain the importance post weld heat treatment 3.3.13 *Ensure appropriate use of PPE.*	**3.3 Performing fillet weld in flat position(1F)** **Overview:** The technique to maintain correct arc length is covered. The information on different types of arc length and its effect is also covered.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 3.3.
- ✓ Share the web links https://youtu.be/AU9KEKJ2tVI and https://youtu.be/KHDDtFgF2YU to understand more on types of arc length and methods to produce an electric arc.
- ✓ Demonstrate maintaining arc length referring to OPERATION SHEET 3.3.
- ✓ Let learners perform OPERATION SHEET 3.3.
- ✓ Let learners solve SAMPLE SELF CHECK 3.3.
- ✓ Let learners read INFORMATION SHEET 3.3.
- ✓ Share the web links https://youtu.be/AU9KEKJ2tVI and https://youtu.be/KHDDtFgF2YU to understand more on types of arc length and methods to produce an electric arc.
- ✓ Let learners watch videos from the web link https://youtu.be/AU9KEKJ2tVI and https://youtu.be/KHDDtFgF2YU and take notes from the video and submit it in the Google classroom forum or any other social media platforms.
- ✓ Let learners solve SAMPLE SELF CHECK 3.3.

D. Assessment:

- ✓ Assess the learners' performance referring to OPERATION SHEET 3.3.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.3.
- ✓ Assess the learners' notes using standard rubrics.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.3.

E. Resources

- ✓ Competency-Based Learning Materials for Class IX
- ✓ Handouts
- ✓ https://youtu.be/AU9KEKJ2tVI (Explains the types of arc length)
- ✓ https://youtu.be/KHDDtFgF2YU (Explains the method of a striking electric arc)

MODULE 1: INTERPRETING ENGINEERING DRAWING

Chapter 1: Draw basic signs, symbols, and dimension

A. Competency/Competencies:

i. Carry out basic engineering drawing
ii. Handle the drawing instruments properly.

B. Learning Objectives/Strand/Broad theme/Chapter/ topics

Learning objectives	Topic
1.1.1 Define engineering drawing. 1.1.2 State the purposes of engineering drawing. 1.1.3 List the types of drawing instruments. 1.1.4 State uses of drawing instruments. 1.1.5 List types and sizes of drawing papers. 1.1.6 Use drawing instruments 1.1.7 *Ensure clean and neatness of drawing.* 1.1.8 *Ensure proper handling of drawing instruments.*	**1.1 Using drawing instruments** **Overview:** The learners can use appropriate drawing instruments to carry out engineering drawing.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 1.1.
- ✓ Exhibit the real instruments and state their functions which are required for the drawing.
- ✓ Share web links https://youtu.be/0Q6QwvtjVm8 OR https://youtu.be/kLe_brmh774 to understand the uses of the drawing instrument in engineering.
- ✓ Demonstrate the uses of drawing instruments referring to OPERATION SHEET 1.1.
- ✓ Let learners practice OPERATION SHEET 1.1.
- ✓ Let learners solve SAMPLE SELF CHECK 1.1.
- ✓ Let learners read INFORMATION SHEET 1.1.
- ✓ Share web links https://youtu.be/0Q6QwvtjVm8 OR https://youtu.be/kLe_brmh774 to understand the uses of the drawing instrument in engineering.
- ✓ Based on the information gathered from the videos and information sheet, Let learners develop a video that explains the functions of the different drawing instruments.
- ✓ Let learners solve SAMPLE SELF CHECK 1.1.

Assessment:

- ✓ Assess the learners' conceptual understanding of different types of drawing instruments and their function by conducting viva.
- ✓ Assess the learners' responses on SAMPLE SELF CHECK 1.1.
- ✓ Assess the learners' knowledge on drawing instruments and their function based on the video prepared and uploaded in the Google Classroom.
- ✓ Assess the learners' responses on SAMPLE SELF CHECK 1.1.

D. Resources

- ✓ Competency-Based Learning Materials
- ✓ https://youtu.be/0Q6QwvtjVm8 (Explains the types of drawing instrument and their uses)
- ✓ https://youtu.be/kLe_brmh774 (Explains the types of drawing instrument and their uses)

A. Competency/Competencies:

i. Layout the drawing sheet as per the required dimensions.

B. Learning objectives/Broad theme/Strand/chapter/topics:

Learning Objectives	Topic
1.2.1 Define layout. 1.2.2 List terminology used for layouts. 1.2.3 Define title block. 1.2.4 Explain the purpose of the title block. 1.2.5 Layout drawing sheet 1.2.6 *Ensure clean and neatness of drawing.* 1.2.7 *Ensure Proper handling of drawing instruments.*	**1.2 Laying out drawing sheet** **Overview:** The learners can lay out drawing sheet.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 1.2.
- ✓ Share the web link https://youtu.be/FzMPAiW8O-s to understand the layout of the drawing sheet as per the required standard.
- ✓ Demonstrate the layout of the drawing sheet referring to OPERATION SHEET 1.2
- ✓ Let learners do in the group followed by individual practices.
- ✓ Let learners solve SAMPLE SELF CHECK 1.2.
- ✓ Let learners read INFORMATION SHEET 1.2.
- ✓ Share the web link https://youtu.be/FzMPAiW8O-s to understand the layout of the drawing sheet as per the required standard.
- ✓ Provide handouts to learners through Google Classroom or any other social media platforms.

- ✓ Let the instructor make a video of the layout of the drawing sheet and upload it in Google Classroom or any other social media platforms.
- ✓ Let learners practice OPERATION SHEET 1.2.
- ✓ Let learners solve SAMPLE SELF CHECK 1.2.

D. Assessment:

- ✓ Assess the learners' performance on designing the layout of the drawing sheet referring to OPERATION SHEET 1.2.
- ✓ Assess the learner's conceptual understanding by letting the learners' responses to SAMPLE SELF CHECK 1.2. Based on the Assessment:, provide necessary intervention.
- ✓ Assess the learners' performance on designing the layout of the drawing sheet referring to OPERATION SHEET 1.2.
- ✓ Assess the learner's conceptual understanding by letting the learners' responses to SAMPLE SELF CHECK 1.2. Based on the Assessment:, provide necessary intervention.

E. Resources:

- ✓ Competency-Based Learning Materials
- ✓ https://youtu.be/FzMPAiW8O-s (Explanation on the layout of drawing sheet)

A. Competency/Competencies:

i. Interpret the signs and symbols as required.

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

Learning objectives	Topic
1.3.1 Define sign and symbol 1.3.2 Draw civil signs and symbols 1.3.3 Define abbreviation 1.3.4 List the abbreviation used in dimensioning 1.3.5 List the abbreviation used in drawing 1.3.6 List the abbreviation used for the units of length 1.3.7 Interpret Engineering Sign, symbols, and abbreviation 1.3.8 *Ensure clean and neatness of drawing* 1.3.9 *Ensure Proper handling of drawing instruments*	**1.3 Interpreting engineering signs, symbols, and abbreviations** **Overview:** The learners can interpret engineering signs, symbols, and abbreviation.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 1.3
- ✓ Share the web link https://youtu.be/MfNoq0y1LLY that explains engineering signs and symbols.

- ✓ Let learners watch the video from the weblinks and gather information on the engineering signs, symbols, and abbreviations.
- ✓ Let learners perform OPERATION SHEET 1.3.
- ✓ Let learners solve SAMPLE SELF CHECK 1.3.
- ✓ Let learners read INFORMATION SHEET 1.3
- ✓ Share the web link https://youtu.be/MfNoq0y1LLY that explains engineering signs and symbols.
- ✓ Let learners watch the video from the weblinks and gather information on the engineering signs, symbols, and abbreviations.
- ✓ Let learners perform OPERATION SHEET 1.3.
- ✓ Let learners solve SAMPLE SELF CHECK 1.3.

D. Assessment:

- ✓ Assess the learners' performance on OPERATION SHEET 1.3
- ✓ Assess the learners' notes gathered from the video using rubrics.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 1.3
- ✓ Assess the learners' performance on OPERATION SHEET 1.3
- ✓ Assess the learners' notes gathered from the video uploaded in Google Classroom using rubrics.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 1.3 uploaded in Google Classroom.

E. Resources:

- ✓ Competency-Based Learning Material
- ✓ https://youtu.be/MfNoq0y1LLY (Explanation on the engineering signs and symbols)

A. Competencies :

i. Draw different types of lines as per the applications.

B. Learning objectives/Topic:

Learning objectives	Topic
1.4.1 Define line. 1.4.2 State types of line and their applications. 1.4.3 Draw different types of lines *1.4.4 Ensure clean and neatness of drawing.* *1.4.5 Ensure Proper handling of drawing instruments.*	**1.4 Drawing different types of lines** **Overview:** The learners can know about different types of lines and draw them.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 1.4
- ✓ Share web links https://youtu.be/SaOoKpLBfYo and https://youtu.be/E6OXZ9OHpVk that explains the different types of lines and their application respectively.
- ✓ Let learners take notes on the different types of lines, their applications, and their symbols.
- ✓ Let learners perform OPERATION SHEET 1.4.
- ✓ Let learners solve SAMPLE SELF CHECK 1.4.
- ✓ Let learners read INFORMATION SHEET 1.4
- ✓ Share web links https://youtu.be/SaOoKpLBfYo and https://youtu.be/E6OXZ9OHpVk that explains the different types of lines and their application respectively.
- ✓ Let learners take notes on the different types of lines, their applications, and their symbols.
- ✓ Let learners perform OPERATION SHEET 1.4.
- ✓ Let learners solve SAMPLE SELF CHECK 1.4.

D. Assessment:

- ✓ Assess notes and drawing containing different types of lines using a rubric or a checklist.
- ✓ Provide necessary intervention based on the Assessment:.
- ✓ Assess the learners' responses on SAMPLE SELF CHECK 1.4.
- ✓ Assess the work uploaded in the Google Classroom to assess learners' understanding of different types of lines.
- ✓ Provide necessary intervention following the Assessment:.
- ✓ Assess the learners' response to SAMPLE SELF CHECK 1.4 uploaded in Google Classroom.

E. Resources:

- ✓ Competency-Based Learning Materials
- ✓ https://youtu.be/SaOoKpLBfYo (Explanation on the different types of lines)
- ✓ https://youtu.be/E6OXZ9OHpVk (Explanation on the application of lines along with the drawing)

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives		Topic
1.5.1	Define lettering and numbering.	**1.5 Drawing letters and numbers** **Overview:** The learners can know about different letter styles, types, sizes and can also draw.
1.5.2	Classify letters style.	
1.5.3	List the types of letters.	
1.5.4	Define freehand lettering.	
1.5.5	List the size of letters.	
1.5.6	State the rules for lettering and numbering.	
1.5.7	Draw letters and numbers	
1.5.8	*Ensure clean and neatness of drawing.*	
1.5.9	*Ensure Proper handling of drawing instruments.*	

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 1.5
- ✓ Share the web link http://ednotebook.hostgator.co.in/basics-of-engineering-drawing that explains the techniques of writing letters and numbers in engineering drawing.
- ✓ Let learners perform OPERATION SHEET 1.5.
- ✓ Let the learners' solve SAMPLE SELF CHECK 1.5.
- ✓ Let learners read INFORMATION SHEET 1.5
- ✓ Share the web link http://ednotebook.hostgator.co.in/basics-of-engineering-drawing that explains the techniques of writing letters and numbers in engineering drawing.
- ✓ Let learners perform OPERATION SHEET 1.5.
- ✓ Let learners solve SAMPLE SELF CHECK 1.5.

D. Assessment:

- ✓ Assess the learners' performance referring to OPERATION SHEET 1.5.
- ✓ Provide necessary intervention and feedback.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 1.5.
- ✓ Assess the learners' performance referring to OPERATION SHEET 1.5.
- ✓ Provide necessary intervention and feedback.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 1.5 uploaded in Google Classroom.

E. Resources:

- ✓ Competency-Based Learning Material
- ✓ http://ednotebook.hostgator.co.in/basics-of-engineering-drawing (Explains the techniques of writing letters and numbers)
- ✓ https://youtu.be/onJIaSAkiEs (Describes the ways to write letters and numbers)

A. Competency/Competencies:

i. Provide dimensions as per the standard.

B. Learning objectives/Topic:

Learning objectives	Topic
1.6.1 Define dimension. 1.6.2 State the types of dimensions. 1.6.3 Explain the system of dimensioning. 1.6.4 State the terminologies of dimensions. 1.6.5 Provide dimensions *1.6.6 Ensure clean and neatness of drawing.* *1.6.7 Ensure Proper handling of drawing instruments.*	**1.6 Providing dimensions** **Overview:** The learners can carry out dimensioning knowing about its types, system and rules.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 1.6
- ✓ Share the web link https://youtu.be/XS0lJsmy-qg that explains the types of dimensioning and systems of dimensioning.
- ✓ Let the learners' take notes from the information gathered from the videos.
- ✓ Let learners perform OPERATION SHEET 1.6.
- ✓ Let learners solve SAMPLE SELF CHECK 1.6.
- ✓ Let learners read INFORMATION SHEET 1.6
- ✓ Share the web link https://youtu.be/XS0lJsmy-qg that explains the types of dimensioning and systems of dimensioning.
- ✓ Let learners take notes from the information gathered from the videos.
- ✓ Let learners perform OPERATION SHEET 1.6.
- ✓ Let learners solve SAMPLE SELF CHECK 1.6.

D. Assessment:

- ✓ Assess the learners' performance referring to OPERATION SHEET 1.6.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 1.6.
- ✓ Assess the learners' performance referring to OPERATION SHEET 1.6.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 1.6 uploaded in Google Classroom.

E. Resources:

- ✓ Competency-Based Learning Material
- ✓ https://youtu.be/XS0lJsmy-qg (Explains the types of dimensioning and systems of dimensioning)

CLASS X

Chapter 3: Performing SMAW on plate

A. Competency/Competencies:

i. Perform groove weld in flat position(1G)

B. Learning objectives/Topic:

Learning objectives	Topic
3.4.1 Define groove weld 3.4.2 State the application of groove weld 3.4.3 Explain the correct selection of welding parameters for 1G position 3.4.4 Explain the differences between back welding and backing weld 3.4.5 State the purpose backing strip 3.4.6 Explain the nomenclature of groove weld 3.4.7 Explain the importance of run-in and run-out plate 3.4.8 *Ensure appropriate use of PPE.*	**3.4 Performing groove weld in flat position(1G)** **Overview:** The topic covers the basic information on the groove weld and its nomenclature.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 3.4.
- ✓ Let learners perform OPERATION SHEET 3.4.
- ✓ Let the learner watch the video from the above Youtube and based on the information gathered from the video, the learner draws the nomenclature of groove weld.
- ✓ Let the learners' solve SAMPLE SELF CHECK 3.4.

D. Assessment:

- ✓ Assess the learners' performance OPERATION SHEET 3.4
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.4.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.4.

E. Resources:

- ✓ CBLM

A. Competency/Competencies:

ii. Perform fillet weld in flat position(1F)

B. Learning objectives/Topic:

Learning objectives	Topic
3.5.1 Explain the correct selection of parameters for SMAW process in 2F position 3.5.2 State the application of fillet weld in 2F position 3.5.3 Explain the welding symbols 3.5.4 *Ensure appropriate use of PPE.*	**3.5 Performing fillet weld in horizontal position(2F)** **Overview:** The technique to weld the fillet weld in horizontal position(2F) is covered.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 3.5.
- ✓ Let learners perform OPERATION SHEET 3.5.
- ✓ Let the learner watch the video from the above Youtube and based on the information gathered from the video, the learner learns the technique of fillet weld in horizontal position.
- ✓ Let the learners' solve SAMPLE SELF CHECK 3.5.

D. Assessment:

- ✓ Assess the learners' performance referring to OPERATION SHEET 3.5.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.5.
- ✓ Assess the learners' notes using standard rubrics.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.5.

E. Resources:

- ✓ CBLM
- ✓ Handouts

A. Competency/Competencies:

ii. Perform grovoe weld in horizontal position(2G)

B. Learning objectives/Topic:

Learning objectives	Topic
3.6.1 Explain the correct selection of welding parameters for 2G position 3.6.2 *Have work ethics and integrity* 3.6.3 *Ensure appropriate use of PPE.*	**3.6 Performing groove weld in horizontal position(2G)** **Overview:** The technique to weld the groove weld in horizontal position(2G) is covered.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 3.6.
- ✓ Let learners perform OPERATION SHEET 3.6.
- ✓ Let the learner watch the video from the above Youtube and based on the information gathered from the video, the learner learns the technique of groove weld in horizontal position.
- ✓ Let the learners' solve SAMPLE SELF CHECK 3.6.

D. Assessment:

- ✓ Assess the learners' performance referring to OPERATION SHEET 3.6.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.6.
- ✓ Assess the learners' notes using standard rubrics.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.6.

E. Resources:

- ✓ CBLM
- ✓ Handouts

A. Competency/Competencies:

i. Perform fillet weld in vertical position(3F)

B. Learning objectives/Topic:

Learning objectives	**Topic**
3.7.1 Explain the correct selection of parameters of SMAW process in 3F position 3.7.2 State the application of SMAW process in 3F position 3.7.3 *Ensure appropriate use of PPE.*	**3.7 Performing fillet weld in vertical position(3F)** **Overview:** The technique to weld the fillet weld in vertical position(3F) is covered.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 3.7.
- ✓ Let learners perform OPERATION SHEET 3.7.
- ✓ Let the learner watch the video from the above Youtube and based on the information gathered from the video, the learner learns the technique of fillet weld in vertical position.
- ✓ Let the learners' solve SAMPLE SELF CHECK 3.7.

D. Assessment:

- ✓ Assess the learners' performance referring to OPERATION SHEET 3.7.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.7.
- ✓ Assess the learners' notes using standard rubrics.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.7.

E. Resources:

- ✓ CBLM
- ✓ Handouts

A. Competency/Competencies:

i. Perform groove weld in vertical position(3G)

B. Learning objectives/Topic:

Learning objectives	Topic
3.8.1 Explain the mode of metal transfer 3.8.2 Explain the correct selection of welding parameters for 3G position 3.8.3 Explain the effects of electromagnetic and gravitational forces on metal transfer 3.8.4 List the measures for controlling molten droplets in 3G 3.8.5 *Ensure appropriate use of PPE.*	**3.8 Performing groove weld in vertical position (3G)** **Overview:** The technique to weld the groove weld in vertical position(3G) is covered besides the mode of metal transfer.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 3.8.
- ✓ Let learners perform OPERATION SHEET 3.8.
- ✓ Share the web link https://youtu.be/4wrc3_SQnBY to further understand the mode of metal transfer.
- ✓ Let the learner watch the video from the above Youtube and based on the information gathered from the video, the learner learns the technique of groove weld in vertical position.
- ✓ Let the learners' solve SAMPLE SELF CHECK 3.8.

D. Assessment:

- ✓ Assess the learners' performance referring to OPERATION SHEET 3.8.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.8.
- ✓ Assess the learners' notes using standard rubrics.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.8.

E. Resources:

- ✓ CBLM
- ✓ https://youtu.be/4wrc3_SQnBY (Mode of metal transfer)

A. Competency/Competencies:

i. Perform fillet weld in overhead position(4F)

B. Learning objectives/Topic:

Learning objectives	Topic
3.9.1 State the application of overhead welding 3.9.2 Explain the correct selection of welding parameters for 4F position 3.9.3 State the measures for controlling molten droplets in 4F position 3.9.4 *Ensure appropriate use of PPE.*	**3.9 Performing fillet weld in overhead position(4F)** **Overview:** The technique to weld the fillet weld in overhead position(4F) is covered besides the application of overhead welding.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 3.9.
- ✓ Let learners perform OPERATION SHEET 3.9.
- ✓ Let the learner watch the video from the above Youtube and based on the information gathered from the video, the learner learns the technique of fillet weld in overhead position.
- ✓ Let the learners' solve SAMPLE SELF CHECK 3.9.

D. Assessment:

- ✓ Assess the learners' performance referring to OPERATION SHEET 3.9.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.9.
- ✓ Assess the learners' notes using standard rubrics.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.9.

E. Resources:

- ✓ CBLM
- ✓ Notes

A. Competency/Competencies:

i. Perform groove weld in overhead position(4G)

B. Learning objectives/Topic:

Learning objectives	Topic
3.10.1 State the application of overhead welding 3.10.2 Explain the correct selection of welding parameters for 4G position 3.10.3 State the measures for controlling molten droplets in 4G position 3.10.4 *Ensure appropriate use of PPE.*	**3.10 Performing groove weld in overhead position(4G)** **Overview:** The technique to weld the groove weld in overhead position(4G) is covered besides the application of overhead welding.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 3.10.
- ✓ Let learners perform OPERATION SHEET 3.10.
- ✓ Let the learner watch the video from the above Youtube and based on the information gathered from the video, the learner learns the technique of groove weld in overhead position.
- ✓ Let the learners' solve SAMPLE SELF CHECK 3.10.

D. Assessment:

- ✓ Assess the learners' performance referring to OPERATION SHEET 3.10.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.10.
- ✓ Assess the learners' notes using standard rubrics.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.10.

E. Resources:

- ✓ CBLM
- ✓ Notes

MODULE 1: INTERPRETING ENGINEERING DRAWING

Chapter 3: Interpreting technical drawing

A. Competency/Competencies:

i. Draw isometric views, orthographic projections, and mechanical machine parts

B. Learning Objectives/Topic:

Learning objectives	Topic
3.1.1 Describe sectional views. 3.1.2 Describe auxiliary views. 3.1.3 Draw isometric views for the different joints. 3.1.4 *Ensure clean and neatness of drawing.* 3.1.5 *Ensure Proper handling of drawing instruments.*	**3.1 Drawing isometric views for different joint** **Overview:** The learners can draw isometric views for different joints besides being able to describe sectional and auxiliary views.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 3.1.
- ✓ Share the web links https://youtu.be/0x4Mq3plkEw and https://youtu.be/vZbrcAGOB_o to understand how sectional view and auxiliary views are drawn.
- ✓ Let the learner performs OPERATION SHEET 3.1 individually.
- ✓ Let learners solve SAMPLE SELF CHECK 3.1.
- ✓ Give additional problem-solving questions.
- ✓ Let learners read INFORMATION SHEET 3.1.
- ✓ Share the web links https://youtu.be/0x4Mq3plkEw and https://youtu.be/vZbrcAGOB_o to understand how sectional view and auxiliary views are drawn.
- ✓ Let the learner performs OPERATION SHEET 3.1 individually.
- ✓ Let learners solve SAMPLE SELF CHECK 3.1.
- ✓ Give additional problem-solving.

D. Assessment:

- ✓ Assess the learners' performance on OPERATION SHEET 3.1.
- ✓ Assess the learners' conceptual understanding of drawing sectional views and auxiliary views using a rubric.
- ✓ Provide necessary feedback and intervention based on the rating from the rubric.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.1.and additional questions.
- ✓ Assess the learners' performance on OPERATION SHEET 3.1.
- ✓ Assess the learners' conceptual understanding of drawing sectional views and auxiliary views using a rubric.
- ✓ Provide necessary feedback and intervention based on the rating from the rubric.

- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.1.and additional questions uploaded in Google Classroom.

E. Resources:

- ✓ CBLM
- ✓ https://youtu.be/0x4Mq3plkEw (Explanations on sectional views and how to create)
- ✓ https://youtu.be/vZbrcAGOB_o (Explanation on axillary views and how to create)

A. Competency/Competencies:

i. Draw mechanical parts as per job requirements.

B. Learning objectives/Topic:

Learning objectives	Topic
3.2.1 Define mechanical drawing. 3.2.2 List types of mechanical drawing. 3.2.3 Explain plan, elevation, and section. 3.2.4 Interpret simple mechanical drawing. *3.2.5 Ensure clean and neatness of drawing.* *3.2.6 Ensure Proper handling of drawing instruments.*	**3.2 Interpreting simple mechanical drawing** **Overview:** The learners can interpret simple mechanical drawing besdies knowing about its types.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 3.2.
- ✓ Share the web link https://ocw.mit.edu/courses/mechanical-engineering/2-007-design-and-manufacturing-i-spring-2009/related-resources/drawing_and_sketching/ and https://youtu.be/1_gzd-yQLuU to explore on types of mechanical drawing and angle elevation.
- ✓ Based on the information gathered, the learner draws a mind map on types of mechanical drawing and drawing elevation.
- ✓ Demonstrate the different types of mechanical drawing and elevation of drawing.
- ✓ Let learners perform OPERATION SHEET 3.2.
- ✓ Let learners solve SAMPLE SELF CHECK 3.2.
- ✓ Let learners read INFORMATION SHEET 3.2.
- ✓ Share the web link https://ocw.mit.edu/courses/mechanical-engineering/2-007-design-and-manufacturing-i-spring-2009/related-resources/drawing_and_sketching/ and https://youtu.be/1_gzd-yQLuU to explore on types of mechanical drawing and angle elevation.
- ✓ Based on the information gathered, the learner draws a mind map on types of mechanical drawing and drawing elevation.
- ✓ Let learners perform OPERATION SHEET 3.2.
- ✓ Let learners solve SAMPLE SELF CHECK 3.2.

D. Assessment:

- ✓ Assess the learners' performance referring to OPERATION SHEET 3.2.
- ✓ Assess the mind map to assess the learner's conceptual understanding of types of mechanical drawing and drawing elevation.
- ✓ Provide necessary intervention.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.2.
- ✓ Assess the learners' performance referring to OPERATION SHEET 3.2.
- ✓ Assess the mind map to assess the learner's conceptual understanding of types of mechanical drawing and drawing elevation.
- ✓ Provide necessary intervention.
- ✓ Assess the learners' responses to SAMPLE SELF CHECK 3.2 uploaded in Google Classroom.

E. Resources:

- ✓ Competency-Based Learning Materials
- ✓ https://ocw.mit.edu/courses/mechanical-engineering/2-007-design-and-manufacturing-i-spring-2009/related-resources/drawing_and_sketching/ (Articles on types of the mechanical drawing)
- ✓ https://youtu.be/1_gzd-yQLuU (Explanations on differences between 1st angle and 3rd angle projection)

A. Competency/Competencies:

i. Develop surface of any mechanical machine parts.

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

Learning Objectives	Topic
3.3.1 Development of surfaces. 3.3.2 Draw mechanical machine parts. 3.3.3 *Ensure clean and neatness of drawing* 3.3.4 *Ensure Proper handling of drawing instruments*	**3.3 Drawing mechanical machine parts** **Overview:** The topic is about development of surfaces and it can enable the learners to draw mechanical machine parts.

C. Learning Experiences:

- ✓ Let learners read INFORMATION SHEET 3.3.
- ✓ Let learners explore information from the following web links:
  https://youtu.be/IwlrJOHgOB8
  https://youtu.be/IIj-f38rO5c
  https://youtu.be/zIblZ7dt3Dk
- ✓ Based on the information, the learner take notes and solve the questions given in the web link https://youtu.be/zIblZ7dt3Dk
- ✓ Let learners perform OPERATION SHEET 3.3 individually.
- ✓ Let learners solve SAMPLE SELF CHECK 3.3.

- ✓ Let learners read INFORMATION SHEET 3.3.
- ✓ Let learners explore information from the following web links:
  https://youtu.be/IwlrJOHgOB8
  https://youtu.be/IIj-f38rO5c
  https://youtu.be/zIblZ7dt3Dk
- ✓ Based on the information, the learner take notes and solve the questions given in the web link https://youtu.be/zIblZ7dt3Dk
- ✓ Let learners perform OPERATION SHEET 3.3 individually.
- ✓ Let learners solve SAMPLE SELF CHECK 3.3.

D. Assessment:

- ✓ Assess the learners' responses to the questions given through the link.
- ✓ Assess the learners' performance referring to OPERATION SHEET 3.3.
- ✓ Assess learners' responses to SAMPLE SELF CHECK3.3.
- ✓ Provide necessary intervention.
- ✓ Assess the learners' responses to the questions given through the link.
- ✓ Assess the learners' performance referring to OPERATION SHEET 3.3.
- ✓ Assess learners' responses to SAMPLE SELF CHECK3.3 uploaded in Google Classroom.
- ✓ Provide necessary intervention.

F. Resources:

- ✓ Competency-Based Learning Materials
- ✓ https://youtu.be/IwlrJOHgOB8 (Explanation on surface development)
- ✓ https://youtu.be/IIj-f38rO5c (Explanation on surface development)
- ✓ https://youtu.be/zIblZ7dt3Dk (Problems-solving on the surface)

RESOURCES

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