MECHANICS
LEVEL – I



CURRICULUM

Based on December, 2021 (V- III) Occupational Standard (OS)

March, 2022
Addis Ababa, Ethiopia

Preface

The reformed TVET-System is an outcome-based system. It utilizes the needs of the labor market and occupational requirements from the world of work as the benchmark and standard for TVET delivery. The requirements from the world of work are analyzed and documented – taking into account international benchmarking – as occupational standards (OS).

In the reformed TVET-System, curricula and curriculum development play an important role with regard to quality driven comparable TVET-Delivery. The Curricula help to facilitate the training process in a way, that trainees acquire the set of occupational competences (skills, knowledge and attitude) required at the working place and defined in the occupational standards (OS).

This curriculum has been developed by a group of professional experts from different Regional TVET Bureaus, colleges, Industries, Institutes and universities based on the occupational standard for mechanics Level I**.**

The curriculum development process has been actively supported and facilitated by **Ministry of Labor and Skills.**

TVET-Program Design

1.1. TVET-Program Title: Mechanics Level I

1.2. TVET-Program Description

The Program is designed to develop the necessary knowledge, skills and attitude of the trainees to the standard required by the occupation. The contents of this program are in line with the occupational standard. The Trainees who successfully completed the Program will be qualified to work as a mechanics with competencies elaborated in the respective OS. Graduates of the program will have the required qualification to work in the **Industry** sector in the field of mechanics**.**

The prime objective of this training program is to equip the Trainees with the identified competences specified in the OS. Graduates are therefore expected to Interpret Drawings and Sketches, Identify Properties of Metals, Perform Bench Work, Cut and Join Sheet Metal, Operate Basic Workshop Machinery, Perform Hand Forging, Perform welding and Cutting Using Oxyacetylene, Perform Routine Metal Arc Welding, Apply Basic Electrical Practices, Apply 5S Procedures in accordance with the performance criteria and evidence guide described in the OS.

1.3. TVET-Program Training Outcomes

The expected outputs of this program are the acquisition and implementation of the following units of competences:

IND MCS1 01 1221 Interpret Drawings and Sketches
IND MCS1 02 1221 Identify Properties of Metals
IND MCS1 03 1221 Perform Bench Work
IND MCS1 04 1221 Cut and Join Sheet Metal
IND MCS1 05 1221 Operate Basic Workshop Machinery
IND MCS1 06 1221 Perform Hand Forging
IND MCS1 07 1221 Perform welding and Cutting Using Oxyacetylene
IND MCS1 08 1221 Perform Routine Metal Arc Welding
IND MCS1 09 1221 Apply Basic Electrical Practices
IND MCS1 10 1221 Apply 5S Procedures

1.4. Duration of the TVET-Program

The Program will have duration of ***620 hours*** including the on school/ Institution training and on-the-job practice or cooperative training time. Such cooperative training based on realities of the industry, nature of the occupation, location of the TVET institution, and other factors will be considered in the training delivery to ensure that trainees acquire practical and workplace experience.

No	Unit competency	TVET Institution training		Cooperative training	Total hours	Remarks
		Theory	Practical			
1.	Apply 5S Procedures	20	10	10	40	
2.	Interpret Drawings and Sketches	27	40	23	90	
3.	Identify Properties of Metals	12	8	20	40	
4.	Apply Basic Electrical Practices	12	14	14	40	
5.	Perform Bench Work	28	40	27	95	
6.	Cut and Join Sheet Metal	15	15	20	50	
7.	Operate Basic Workshop Machinery	23	22	30	75	
8.	Perform Hand Forging	13	12	20	45	
9.	Perform welding and Cutting Using Oxyacetylene	24	20	36	80	
10.	Perform Routine Metal Arc Welding	15	25	25	65	
Total Hrs		**189**	**206**	**225**	**620**	

1.5. Qualification Level and Certification

Based on the descriptors elaborated on the Ethiopian National TVET Qualification Framework (NTQF) the qualification of this specific TVET Program is Level I**.**

The trainee can exit after successfully completing the modules in one level and will be awarded the equivalent institutional certificate on the level completed. However, only institutional certificate of training accomplishment will be awarded.

1.6. Target Groups

Any citizen with disability who meets the entry requirements under items 1.7 and capable of participating in the training activities is entitled to take part in the Program.

1.7 Entry Requirements

The prospective participants of this program are required to possess the requirements or directive of the **Ministry of Labor and Skills**.

1.8 Mode of Delivery

This TVET-Program is characterized as a formal Program on middle level technical skills. The mode of delivery is co-operative training. The time spent by the trainees in the real work place/ industry will give them enough exposure to the actual world of work and enable them to get hands-on experience.

The co-operative approach will be supported with school-based lecture-discussion, simulation and actual practice. These modalities will be utilized before the trainees are exposed to the industry environment.

Hence based on the nature of the occupation, location of the TVET institutions, and interest of the industry alternative mode of cooperative training such as apprenticeships, internship and traineeship will be employed. In addition, in the areas where industry is not sufficiently available the established production and service centers/learning factories in TVET institutions will be used as cooperative training places. The Training-Institution and identified companies have forged an agreement to co-operate with regard to the implementation of this program.

1.9. TVET-Program Structure

Unit of Competence		Module Code & Title		Training Outcomes	Duration (In Hours)
IND MCS1 10 1221	Applying 5S Procedures	**IND MCS1 M01 0322**	Applying 5S Procedures	• Prepare for work • Sort items. • Set all items in order • Perform shine activities. • Standardize 5S. • Sustain 5S.	40
IND MCS1 01 1221	Interpret Drawings and Sketches	**IND MCS1 M02 0322**	Interpreting Drawings and Sketches	• Identify technical drawing • Identify views, standard symbols and lines • Interpret technical drawing • Assess Drawing quality	90
IND MCS1 02 1221	Identify Properties of Metals	**IND MCS1 M03 0322**	Identifying Properties of Metals	• Classify common ferrous and non-ferrous metals • Contribute to management of OHS in the workplace • Test basic applications and methods for manufacturing • Perform basic common metal tests • Define common heat treatment outcomes and applications • Assess quality of test and complete documentation	40
IND MCS1 09 1221	Apply Basic Electrical Practices,	**IND MCS1 M04 0322**	Applying Basic Electrical Practices	• Prepare for work • Conduct minor handling and maintenance • Notify the completion of quality work	40
IND MCS1 03 1221	Perform Bench Work	**IND MCS1 M05 0322**	Performing Bench Work	• Identify workplace procedures for occupational health and safety • Perform hand tool operations • Perform basic drill, ream and hone operations	95

				• Perform Off-hand grind cutting tools • Develop effective workplace relationship	
IND MCS1 04 1221	Cut and Join Sheet Metal	**IND MCS1 M06 0322**	Cutting and Joining Sheet Metal	• Plan and prepare work • Cut and join sheet metal • Quality assure work and clean up	50
IND MCS1 05 1221	Operate Basic Workshop Machinery	**IND MCS1 M07 0322**	Operating Basic Workshop Machinery	• Identify machine shop procedures for occupational health and safety • Determine and plan job requirements • Set-up machine • Perform machine operations • Quality assure finished component	75
IND MCS1 06 1221	Perform Hand Forging,	**IND MCS1 M08 0322**	Performing Hand Forging,	• Identify forging work shop procedures for occupational health and safety • Analyze and plan hand forging work • Perform hand forging techniques • Quality assure work	45
IND MCS1 07 1221	Perform welding and Cutting Using Oxyacetylene	**IND MCS1 M09 0322**	Performing welding and Cutting Using Oxyacetylene	• Prepare *Oxyacetylene* welding and cutting equipment's and apply OHS in work shop • Set up oxyacetylene welding and cutting outfit • Weld and Cut materials with Oxy acetylene	80
IND MCS1 08 1221	Perform Routine Metal Arc Welding	**IND MCS1 M10 0322**	Performing Routine Metal Arc Welding	• Plan and prepare welding work • Perform welding Practices • Assure quality and clean up	65

*The time duration (Hours) indicated for the module should include all activities in and out of the TVET institution.

1.10 Institutional Assessment

Two types of evaluation will be used in determining the extent to which training outcomes are achieved. The specific training outcomes are stated in the modules. In assessing them, verifiable and observable indicators and standards shall be used.

The ***formative assessment*** is incorporated in the training modules and form part of the training process. Formative evaluation provides the trainee with feedback regarding success or failure in attaining training outcomes. It identifies the specific training errors that need to be corrected, and provides reinforcement for successful performance as well. For the teacher, formative evaluation provides information for making instruction and remedial work more effective.

Summative Evaluation the other form of evaluation is given when all the modules in the program have been accomplished. It determines the extent to which competence have been achieved. And, the result of this assessment decision shall be expressed in the term of institutional Assessment implementation guidelines..

Techniques or tools for obtaining information about trainees' achievement include oral or written test, demonstration and on-site observation.

1.11 TVET Teachers Profile

The teachers conducting this particular TVET Program are B Level and above who have satisfactory practical experiences or equivalent qualifications.

LEARNING MODULE 01
TVET-PROGRAMME TITLE: **MECHANICS Level I**
MODULE TITLE: **Apply 5S Procedures**
MODULE CODE: **IND MCS1 M01 0222**
NOMINAL DURATION: **40 Hours**
MODULE DESCRIPTION: This module covers the knowledge, skills and attitude required to apply 5S techniques to his/her workplace. It covers responsibility for the day-to-day operations of the workplace and ensuring that continuous improvements of Kaizen elements are initiated and institutionalized.

LEARNING OUTCOMES

At the end of the module the trainee will be able to:

LO1. Prepare for work
LO2. Sort items.
LO3. Set all items in order.
LO4: Perform shine activities.
LO5: Standardize 5S.
LO6: Sustain 5S

MODULE CONTENTS:

LO1. Prepare for work
- 1.1 Using work instructions
- 1.2 Reading and interpreting Job specifications.
- 1.3 Observing OHS requirements.
- 1.4 Preparing and using Tools and equipment
- 1.5 Identifying and checking Safety equipment and tools

LO2. Sort items.
- 2.1 Preparing plan.
- 2.2 Performing cleaning activities
- 2.3 Identifying all items
- 2.4 Listing necessary and unnecessary items
- 2.5 Using red tag strategy.
- 2.6 Evaluating and placing unnecessary items
- 2.7 Recording and quantifying necessary items.
- 2.8 Reporting performance results
- 2.9 Checking necessary items regularly

LO3. **Set all items in order.**
- 3.1 Preparing plan to implement set in order
- 3.2 Performing general cleaning activities
- 3.3 Deciding location/layout, storage and indication methods.
- 3.4 Preparing and using necessary tools and equipment.
- 3.5 Placing items in their locations.
- 3.6 Returning items after use
- 3.7 Reporting performance results.
- 3.8 Checking regularly each item

LO4: **Perform shine activities.**
- 4.1 Preparing plan

4.2 Preparing and using tools and equipment
4.3 Implementing shine activity
4.4 Reporting performance results
4.5 Conducting regular shining activities

LO5: **Standardize 5S.**

5.1 Preparing and using plan to standardize.
5.2 Preparing and implementing tools and techniques
5.3 Reporting relevant personnel checklists
5.4 Specifying the workplace.
5.5 Avoiding problems.

LO6: Sustain 5S

6.1 Preparing and following plan
6.2 Discussing , preparing and implementing tools and techniques
6.3 Inspecting workplace regularly
6.4 Cleaning workplace
6.5 Identifying situations
6.6 Recommending improvements
6.7 Following checklists.
6.8 Avoiding problems.

Learning Methods:				
For none impaired trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in **Audio/video** ❖ Organize the class room seating arrangement to be accessible to trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop
Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ rovide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ rovide tutorial support (if necessary)	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist ❖ Conduct close follow up ❖ rovide tutorial support (if necessary
Group discussion	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Use sign language interpreters ❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up	❖ Introduce the trainees with their peers

	❖ Brief the thematic issues of the work	group member	❖ Introduce the trainees with other group member ❖ Inform the group members to speak loudly	
Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary
Individual assignment	❖ prepare the assignment questions in large text ❖ Encourage the trainees to prepare and submit the assignment in large texts ❖ Make available recorded assignment questions ❖ Facilitate the trainees to prepare and submit the assignment in soft or hard copy	❖ Use sign language interpreter ❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	

ASSESSMENT METHODS:				
Interview		❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges
Written test	❖ Prepare the exam in large texts ❖ Use interview as an option if necessary ❖ Prepare the exam in audio format ❖ Assign human reader ❖ (if necessary) ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, true or false, matching and short answers if necessary.	❖ Use oral response as an option to give answer for trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration/ Observation	❖ Brief the instruction or provide them in large text ❖ Time extension	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

ASSESSMENT CRITERIA:

LO.1 Prepare for work

- Work instructions are used to determine job requirements, including method, material and equipment.
- Job specifications are read and interpreted following working manual.
- OHS requirements, including dust and fume collection, breathing apparatus and eye and ear personal protection needs are observed throughout the work.
- Tools and equipment are prepared and used to implement 5S.
- Safety equipment and tools are identified and checked for safe and effective operation.
- Kaizen Board (Visual Management Board) is prepared and used in harmony with different workplace contexts

LO.2 Sort items.

- Plan is prepared to implement sorting activities.
- Cleaning activities are performed.
- All items in the workplace are identified following the appropriate procedures.
- Necessary and unnecessary items are listed using the appropriate format.
- Red tag strategy is used for unnecessary items.
- Unnecessary items are evaluated and placed in an appropriate place other than the workplace.
- Necessary items are recorded and quantified using appropriate format.
- Performance results are reported using appropriate formats.
- Necessary items are regularly checked in the workplace.

LO.3 Set all items in order

- Plan is prepared to implement set in order activities.
- General cleaning activities are performed.
- Location/Layout, storage and indication methods for items are decided.
- Necessary tools and equipment are prepared and used for setting in order activities.
- Items are placed in their assigned locations.
- After use, the items are immediately returned to their assigned locations.
- Performance results are reported using appropriate formats.
- Each item is regularly checked in its assigned location and order

LO4: Perform shine activities.

- Plan is prepared to implement shine activities.
- Necessary tools and equipment are prepared and used for shinning activities.
- Shine activity is implemented using appropriate procedures.
- Performance results are reported using appropriate formats.
- Regular shining activities are conducted.

LO5: Standardize 5S

- Plan is prepared and used to standardize 5S activities.
- Tools and techniques to standardize 5S are prepared and implemented based on relevant procedures.
- Checklists are followed for standardize activities and reported to relevant personnel.

- The workplace is kept to the specified standard.
- Problems are avoided by standardizing activities

LO6: Sustain 5S

- Plan is prepared and followed to sustain 5S activities.
- Tools and techniques to sustain 5S are discussed, prepared and implemented based on relevant procedures.
- Workplace is inspected regularly for compliance to specified standard and sustainability of 5S techniques.
- Workplace is cleaned up after completion of job and before commencing next job or end of shift.
- Situations are identified where compliance to standards is unlikely and actions specified in procedures are taken.
- Improvements are recommended to lift the level of compliance in the workplace.
- Checklists are followed to sustain activities and report to relevant personnel.
- Problems are avoided by sustaining activities

Annex: Resource Requirements

IND MCS1 M01 0322 Applying 3S				
Item No.	Category/Item	Description/ Specifications	Quantity (pc./participant)	Recommended Ratio (Item: Trainee)
A.	Learning Materials			
1	TTLM	Prepared by trainer	25	1:1
2	Textbook	any book related to Quality and safety	5	1:5
3	Reference book	5S for operators (1995)	5	1:5
	Journals/publications/magazines			
B.	Learning Facilities & Infrastructure			
1	Lecture room	Standard	1	1:25
C.	Consumable Materials			
1	Copy paper	A4 size	1rim	1:25
2	Paint	STD	1galon	1:1
3	Sticker	STD	25	1:1
4	Nails	STD	As required	
5	Chip wood	STD	As required	
6	Sponge	STD	As required	
7	Broom	STD	As required	
D.	**Tools and Equipment's**			
1	dust masks / goggles glove working cloth first aid and safety shoes brush	Standard	25	1:1
2	Shelves			
3	Signboard			

LEARNING MODULE 02
TVET-PROGRAMME TITLE: **Mechanics Level I**
MODULE TITLE: **Interpreting Drawings and Sketches**
MODULE CODE: **IND MCS1 M02 0322**
NOMINAL DURATION: **90 Hours**
MODULE DESCRIPTION: This module covers the competence required to produce sketches, pictorial drawings (3-D), multi-view, and sectional views relevant to furniture making.
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1.** Identify technical drawing **LO2.** Identify views, standard symbols and lines **LO3**. Interpret technical drawing **LO4.** Assess Drawing quality
MODULE CONTENTS: **LO1. Identify technical drawing** 1.1 Introduction to technical drawing 1.2 Using tools and equipment 1.3 Checking and validating drawing version 1.4 Confirming and following Instructions **LO2. Identify views, standard symbols and lines** 2.1 Identifying orthographic and isometric drawing 2.2 Explaining orthographic and isometric views 2.3 Identifying alphabet of lines 2.4 Identifying and explaining symbols & Codes **LO3. Interpret technical drawing** 3.1 Recognizing component, assembly or object projections 3.2 Interpreting drawing symbols and codes 3.3 Identifying dimensions and material requirements 3.4 Interpreting dimensional tolerances and notations **LO4 Assess Drawing quality** 4.1 Checking drawing quality 4.2 Evaluating drawing 4.3 Identifying causes of any faults 4.4 Taking corrective actions

Learning Methods:				
For none impaired trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in **Audio/video** ❖ Organize the class room seating arrangement to be accessible to trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop
Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ rovide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ rovide tutorial support (if necessary)	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist ❖ Conduct close follow up ❖ rovide tutorial support (if necessary
Group discussion	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Use sign language interpreters ❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up	❖ Introduce the trainees with their peers

	❖ Brief the thematic issues of the work	group member	❖ Introduce the trainees with other group member ❖ Inform the group members to speak loudly	
Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary
Individual assignment	❖ prepare the assignment questions in large text ❖ Encourage the trainees to prepare and submit the assignment in large texts ❖ Make available recorded assignment questions ❖ Facilitate the trainees to prepare and submit the assignment in soft or hard copy	❖ Use sign language interpreter ❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	

ASSESSMENT METHODS:				
Interview		❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges
Written test	❖ Prepare the exam in large texts ❖ Use interview as an option if necessary ❖ Prepare the exam in audio format ❖ Assign human reader ❖ (if necessary) ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, true or false, matching and short answers if necessary.	❖ Use oral response as an option to give answer for trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration/ Observation	❖ Brief the instruction or provide them in large text ❖ Time extension	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

ASSESSMENT CRITERIA:

LO.1 Identify technical drawing

- Drawing is checked and validated against job requirements.
- Drawing version is checked and validated
- Instructions are confirmed and followed as required

LO.2 Identify views, standard symbols and lines

- Orthographic and isometric drawing are identified
- Orthographic and isometric views are explained
- Alphabet of lines are identified
- Uses of the alphabet of lines are explained
- Codes and symbols are correctly identified and explained according to drawing standards

LO.3 Interpret technical drawing

- Component, assembly or object is recognized as required.
- Drawing symbols and codes are interpreted appropriately.
- Dimensions and material requirements are identified, understood and followed as required.
- Dimensional tolerances, notations are interpreted according to specifications.

LO.4 Assess Drawing quality

- Drawings are quality checked against standards and specifications.
- Drawings are evaluated using the appropriate evaluation parameters and in accordance with standards.
- Causes of any identified faults are identified and corrective actions are taken in accordance with policies and procedures.

Annex: Resource Requirements

IND MCS1 02 0322 Interpreting Drawings and Sketches				
Item No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Item: Learner)
A.	**Learning Materials**			
1.	TTLM	Prepared by trainer's	25	1:1
2.	Textbooks	--	-	-
3.	Reference Books	Motivate series technical drawing (macmillan education) By:A.Yarwood sep.19,1994	To be sufficient as required	1:1
4.	Journals/Publication/Magazines			
B.	**Learning Facilities & Infrastructure**			
1.	Lecture ,drawing Room, Chalk board	Suitable for training	-	-
2.	Library , Sample documents	With sufficient reference books	-	-
C.	**Consumable Materials**			
1	Copy paper Drawing paper	A_4, A_3 2H,6H,HB Standard as required	To be sufficient as required	1:1
2	Masking tape & Eraser	Standard as required	To be sufficient as required	1:1
D.	**Tools and Equipments**			
1. 1	T-square	STD	To be sufficient as required	1:1
2. 2.	Drawing triangle	45^0 X 90^0	25	1:1
3.	Drawing triangle	30^0 X 60^0	25	1:1
4.	Compass	Set	25	1:1
5.	Divider	Set	25	1:1
6.	Mechanical Pencil	0.5 mm & 0.7 mm	25	1:1

LEARNING MODULE 03

TVET-PROGRAMME TITLE: **Mechanics Level I**

MODULE TITLE: **Identifying Properties of Metals**

MODULE CODE: **IND MCS1 03 0322**

NOMINAL DURATION: **40 Hours**

MODULE DESCRIPTION: This module covers the basic skills, knowledge and attitudes required to classify the characteristics of different ferrous and non-ferrous metals, applications, common treatments, testing procedures and quality checked in metal engineering manufacturing..

LEARNING OUTCOMES

At the end of the module the trainee will be able to:

LO1. Classify common ferrous and non-ferrous metals
LO2. Contribute to management of OHS in the workplace
LO3. Test basic applications and methods for manufacturing
LO4. Perform basic common metal tests
LO5. Define common heat treatment outcomes and applications
LO6. Assess quality of test and complete documentation

MODULE CONTENTS:

LO1. Classify common ferrous and non-ferrous metals

1.1. Classifying distinctions between ferrous, non-ferrous metals and alloys
1.2. Identifying metal properties

LO2. Contribute to management of OHS in the workplace

2.1 Rising personnel protective equipment (PPE) issues
2.2 Demonstrating Preventative OHS procedures

LO3. Test basic applications and methods for manufacturing

3.1 Selecting Correct cutting tools

3.2 Testing basic on cast-ability, weld-ability, forge-ability and corrosion resistance
3.3 Carrying out of processing engineering materials for rolling, forging, extrusion, drawing and spinning

3.4 Experiencing methods of manufacturing processes

LO4 Perform basic common metal tests

4.1 Selecting basic metal tests.
4.2 Comparing and recording Basic material test results.

LO5. Define common heat treatment outcomes and applications

5.1 Identifying the most common heat treatment processes.
5.2 Explaining changes in metal properties
5.3 Explaining the reasons for heat treatment.

LO6. Assess quality of test and complete documentation

6.1 Checking service render quality
6.2 Evaluating service render
6.3 Identifying faults and taking corrective actions.
6.4 Recording service processes and outcomes.

Learning Methods:				
For none impaired trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in **Audio/video** ❖ Organize the class room seating arrangement to be accessible to trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop
Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ rovide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ rovide tutorial support (if necessary)	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist ❖ Conduct close follow up ❖ rovide tutorial support (if necessary

Group discussion	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Brief the thematic issues of the work	❖ Use sign language interpreters ❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Inform the group members to speak loudly	❖ Introduce the trainees with their peers
Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary
Individual assignment	❖ prepare the assignment questions in large text ❖ Encourage the trainees to prepare and submit the assignment in large texts ❖ Make available recorded assignment questions ❖ Facilitate the trainees to prepare and submit the assignment in soft or hard copy	❖ Use sign language interpreter ❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	
ASSESSMENT METHODS:				
Interview		❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges

Written test	❖ Prepare the exam in large texts ❖ Use interview as an option if necessary ❖ Prepare the exam in audio format ❖ Assign human reader ❖ (if necessary) ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, true or false, matching and short answers if necessary.	❖ Use oral response as an option to give answer for trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration/Observation	❖ Brief the instruction or provide them in large text ❖ Time extension	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

ASSESSMENT CRITERIA:

LO.1 Classify common ferrous and non-ferrous metals

- Distinctions between ferrous and non-ferrous metals and alloys are classified in terms of color codes, strength, density, corrosion resistance, electrical conductivity and magnetic properties.
- Metal properties are identified like yield stress, proof stress, tensile stress, elongation, impact strength, toughness, fatigue strength, wear resistance, heat resistance, hardness, bending.

LO.2 Contribute to management of OHS in the workplace

- Personnel Protective Equipment (PPE) issues are raised with designated personnel in accordance with workplace procedures and relevant OHS legislation.
- Preventative OHS procedures are demonstrated throughout all scope of work, and with regards to workplace standards and regulations

LO.3 Test basic applications and methods for manufacturing

- Correct cutting tools are selected for the machinability
- Basics on cast-ability, weld-ability, forge-ability and corrosion resistance are tested.
- Basic methods are carried out of processing engineering engineering materials for rolling, forging, extrusion, drawing and spinning.
- Methods of manufacturing in hot working, cold working and thermal processes are experienced.

LO.4 Perform basic common metal tests

- Basic metal tests of tensile, hardness, shear, impact, spark and bend tests are selected, prepared and carried out .
- Basic material test results are recorded and compared.

LO5 Define common heat treatment outcomes and applications

- The most common heat treatment processes used are identified
- The changes in metal properties caused by heating are explained
- The reasons for heat treatment use are explained

LO6 Assess quality of test and complete documentation

- Services rendered are quality checked against standards and specifications.
- Services rendered are evaluated using the appropriate evaluation parameters and in accordance with standards.

Annex: Resource Requirements

IND MCS1 M03 0322 Identifying properties of metals				
Item No.	Category/Item	Description/ Specifications	Quantity (pc./participant)	Recommended Ratio (Item: Trainee)
A.	**Learning Materials**			
1	TTLM	Prepared by trainer	25	1:1
2	Textbook	-		
3	Reference book	-The motive series Macmillan text for industrial vocation & technical education -Mechanical properties and working of metals and alloys	5	1:5
B.	**Learning Facilities & Infrastructure**			
1	Classroom, work shop library, Chalk board/ white board/ Green board, Sample documents, Written	Suitable for training	As required	-
C.	**Consumable Materials**			
1	Copy paper	A4 size	25	1:1
D.	**Tools and Equipments**			
1	Material hardness testing equipment's	Birnel, Rockwell, and vicker hardness tester	As required	1:5
2	Common engineering materials	Ferrous, non ferrous metals	As required	1:5

LEARNING MODULE 04
TVET-PROGRAMME TITLE: **MECHANICS Level I**
MODULE TITLE: **Applying Basic Electrical Practices**
MODULE CODE: **IND MCS1 04 0322**
NOMINAL DURATION: **40 Hours**
MODULE DESCRIPTION: This module covers the skills, knowledge and attitudes required to apply minor/basic handling and maintenance practices associated with a range of electrical equipment at the metal engineering workplace
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1.** Prepare for work **LO2.** Conduct minor handling and maintenance **LO3.** Notify the completion of quality work
MODULE CONTENTS: **LO1.** Prepare for work 1.1 Identifying work requirements 1.2 Identifying occupational health and safety standards 1.3 Selecting materials and equipment required to perform the tasks 1.4 Identifying and interpreting relevant plans, drawings and texts 1.5 Set-up work plan in detail 1.6 Identifying and prevention potential hazards 1.7 Preparing work area 1.8 Resolving co-ordination requirements, **LO2.** Conduct minor handling and maintenance 2.1 Conforming required isolations 2.2 Conducting minor maintenance 2.3 Undertaking minor adjustments 2.4 Reporting fault **LO3**. Notify the completion of quality work 3.1 Completing work and responsible personnel 3.2 Making final checks with supervisor 3.3 Securing and restored work area 3.4 . Maintaining and storing plant, tools and equipment

Learning Methods:				
For none impaired trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in **Audio/video** ❖ Organize the class room seating arrangement to be accessible to trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop
Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ rovide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ rovide tutorial support (if necessary)	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist ❖ Conduct close follow up ❖ rovide tutorial support (if necessary
Group discussion	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Use sign language interpreters ❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up	❖ Introduce the trainees with their peers

	❖ Brief the thematic issues of the work	group member	❖ Introduce the trainees with other group member ❖ Inform the group members to speak loudly	
Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary
Individual assignment	❖ prepare the assignment questions in large text ❖ Encourage the trainees to prepare and submit the assignment in large texts ❖ Make available recorded assignment questions ❖ Facilitate the trainees to prepare and submit the assignment in soft or hard copy	❖ Use sign language interpreter ❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	

ASSESSMENT METHODS:				
Interview		❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges
Written test	❖ Prepare the exam in large texts ❖ Use interview as an option if necessary ❖ Prepare the exam in audio format ❖ Assign human reader ❖ (if necessary) ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, true or false, matching and short answers if necessary.	❖ Use oral response as an option to give answer for trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration/ Observation	❖ Brief the instruction or provide them in large text ❖ Time extension	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

ASSESSMENT CRITERIA:

LO.1 Prepare for work

- Work requirements are identified from relevant work orders or equivalent
- Occupational Health and Safety standards, statutory requirements, relevant Ethiopian standards, codes of practice, manufacturers' specifications, environmental regulations and enterprise procedures are identified, applied and monitored according to regulations throughout the work process
- Resources (material and equipment) required to perform the tasks are selected for compliance with the work specifications
- Relevant plans, drawings and texts are identified and interpreted in accordance with the work plan
- Work plan is set-up in detail according to regulations
- Potential hazards are identified and prevention and/or control measures are selected in accordance with regulations
- Work area is prepared in accordance with work requirements and site specifications
- Co-ordination requirements, including requests for isolations where appropriate, are resolved with others involved, affected or required by the work according to regulations

LO.2 Conduct minor handling and maintenance

- Required isolations are confirmed where appropriate in accordance with enterprise requirements
- Minor maintenance is conducted in accordance with the work plan and site requirements
- Minor adjustments are undertaken in accordance with prescribed procedures and schedules and site requirements
- Faults are reported to the relevant and responsible parties in accordance with site/enterprise procedures

LO.3 Notify the completion of quality work

- Work is completed and responsible personnel notified in accordance with site/enterprise requirements and regulations
- Final checks with supervisor are made to ensure the work conforms with instructions and regulation
- Work area is cleared of waste, cleaned, restored and secured in accordance with site/enterprise regulations
- Plant, tools and equipment are maintained and stored in accordance with site/enterprise procedures

Annex: Resource Requirements

IND MCS1 04 0322 Apply Basic Electrical Practices				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	***Learning Materials***			
1.	TTLM	TTTLM prepared by the trainer	25	1:1
2.	Reference Books	-Motivate series Macmillan text for Electrical installation By: J.M. Hyde	To be sufficient as required	1:1
3	Text books	--	--	--
B.	***Learning Facilities & Infrastructure***			
1.	Classroom, work shop library, Chalk board/ white board/ Green board, Sample documents, Written materials,	Suitable for training	-	-
C.	***Consumable Materials***			
1. 2 3 4	Connectors Electrical wire Cable trays, Brackets Trenches etc	STD	1 set	1:5
D.	***Tools and Equipments***			
1.	Control wiring, machinery, switchboards and other electrical apparatus, clamping, crimping, pin connection, soldered joints, plugs, sockets	STD	To be sufficient as required	1:5
2	• general hand tools • portable electrical tools, • measuring tools • specialist tools. • lubricants, • cleaning agents, • contact cleaners, • emery paper • filters • battery cells • air conditioners • cooling plant • transformers • switchboards	STD	To be as required	1:5

	• control panels			

LEARNING MODULE 05
TVET-PROGRAMME TITLE: **MECHANICS Level I**
MODULE TITLE: **Performing Bench Work**
MODULE CODE: **IND MCS1 05 0322**
NOMINAL DURATION: **95 Hours**
MODULE DESCRIPTION: This Module covers the skills, knowledge and attitudes required to determine team work requirements and perform basic bench work operations (i.e. layout; cutting with hacksaw and chisel; filing; drilling; tapping) and check the components for conformance to specifications
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1.** Identify workplace procedures for occupational health and safety **LO2.** Plan task and prepare work piece **LO3**. Perform hand tool operations **LO4.** Perform basic drill, ream and hone operations **LO5.** Perform Off-hand grind cutting tools **LO6.** Develop effective
MODULE CONTENTS: **LO1. Identify workplace procedures for occupational health and safety** 1.1 Identifying Personnel Protective Equipment (PPE) 1.2 Demonstrating preventative OHS procedures 1.3 Identifying and reporting risk and Hazards **LO2. Plan task and prepare work piece** 2.1 Applying safety regulation 2.2 Planning work activities sequentially 2.3 Selecting materials specifications 2.4 Marking dimensions/features on work piece **LO3**. **Perform hand tool operations** 3.1 Clamping work pieces 3.2 Selecting and using hand tools 3.3 Cutting, chipping, filing and scraping work pieces with in tolerances 3.4 Cutting Threads

3.5 Performing bench work operations
3.6 Applying safety procedures and using personal protective equipment's.

LO4. Perform basic drill, ream and hone operations

4.1 Drilling, boring, reaming and honing Bore holes
4.2 Performing all operations using safety procedures.

LO5. Perform Off-hand grind cutting tools

5.1 Honing cut edges
5.2 Sharpening Cutters
5.3 Using appropriate cooling agent to grinding Cutters
5.4 Performing cutting tool grinding
5.5 Applying safety procedures and using personal protective equipment's.

LO6. Develop effective workplace relationship

6.1 Doing duties and responsibilities in positive manner
6.2 Seeking assistance from Workgroup
6.3 Encouraging, acknowledging and acting upon Feedback on performance
6.4 Respecting and acknowledging personal values and beliefs

Learning Methods:				
For none impaired trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in **Audio/video** ❖ Organize the class room seating arrangement to be accessible to trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop
Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ rovide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ rovide tutorial support (if necessary)	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist ❖ Conduct close follow up ❖ rovide tutorial support (if necessary

Group discussion	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Brief the thematic issues of the work	❖ Use sign language interpreters ❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Inform the group members to speak loudly	❖ Introduce the trainees with their peers
Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary

Individual assignment	❖ prepare the assignment questions in large text ❖ Encourage the trainees to prepare and submit the assignment in large texts ❖ Make available recorded assignment questions ❖ Facilitate the trainees to prepare and submit the assignment in soft or hard copy	❖ Use sign language interpreter ❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	

ASSESSMENT METHODS:				
Interview		❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges
Written test	❖ Prepare the exam in large texts ❖ Use interview as an option if necessary ❖ Prepare the exam in audio format ❖ Assign human reader ❖ (if necessary) ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, true or false, matching and short answers if necessary.	❖ Use oral response as an option to give answer for trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration /Observation	❖ Brief the instruction or provide them in large text ❖ Time extension	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

		❖ Time extension		

ASSESSMENT CRITERIA:

LO.1 Identify workplace procedures for occupational health and safety

- Personnel Protective Equipment (PPE) issues are raised with designated personnel in accordance with workplace procedures and relevant OHS legislation.
- Preventative OHS procedures are demonstrated throughout all scope of work, and with regards to workplace standards and regulations
- Hazards in the work area are recognized and reported to designated personnel according to workplace procedures

LO.2 Plan task and prepare work piece

- Work activities are sequentially planned based on the required tasks and the applied safety regulations
- Materials are selected according to specifications of the drawing.
- Dimensions/features are marked on work piece in accordance with drawing specifications

LO.3 Perform hand tool operations

- Work pieces are clamped based on instructions and applied standards.
- Hand tools are selected and used according to task and safety regulations
- Work pieces are cut, chipped, filed or scraped within tolerances specified in the drawing.
- Threads are cut according to standard procedures
- Bench work operations are performed applying safety procedures and using personal protective devices.

LO.4 Perform basic drill, ream and hone operations

- Boreholes are drilled, reamed and honed to drawing specification and according to guidance.
- All operations are performed applying safety procedures and using personal protective devices.

LO.5 Perform Off-hand grind cutting tools

- Cut edges are honed and free of burrs.
- Cutter is sharpened to conform to specifications.
- Cutters are ground using appropriate cooling agents.
- Cutting tool grinding is performed applying safety procedures and using personal protective devices.

LO.6 Develop effective workplace relationship

- Duties and responsibilities are done in a positive manner to promote cooperation and good relationship
- Trainer is sought from workgroup when difficulties arise and addressed through discussions
- Feedback on performance provided by others in the team is encouraged, acknowledged and acted upon
- Differences in personal values and beliefs are respected and acknowledged in the development

Annex: Resource Requirements

IND MCS1 05 0322 Perform Bench Work				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio**

				(Item: Trainee)
A.	***Learning Materials***			
1.	TTLM	TTTLM prepared by the trainer	25	1:1
2.	Reference Books	The motive series MacMillan text for industrial vocation &technical education metal work technology any book related to bench work operation	5	1:5
3.	Journals/Publication/Magazines			
B.	***Learning Facilities & Infrastructure***			
1.	Lecture room / work shop	STD	1	25:1
2.	Library	With sufficient books	1	25:1
3.	Industry	Sufficient equipment	-	-
C.	***Consumable Materials***			
1.	Copy paper	A4	25rim	1:1
2	Grinder disc	180 mmØ	5 pack	1:5
5	Cutting disc	180 mmØ	5 pack	1:5
6	RHS	20X30,20x40X2mm	5 Bergan	1:5
8	Sheet Metal	1000X2000X1mm	5	1:5
9	SHS	20x20,25x25x2mm, etc.	As requuired	1:5
10	Round bar	Dia10-20mm	As required	1:1
D.	***Tools and Equipments***			
1	Electric grinder	STD/Makita/	5	1:5
2	Electric drill	STD	5	1:5
3	Scriber	Standard as required	25	1:1
4	Hacksaw with blade	Adjustable and fixed frame with 200mm and 300mm length blades	100	1:5
5	Chisels	STD	25	1:1
6	Hand tap and die	M10,M12,M14 etc.	5 sets	1:5
7	Files	STD	25	1:1
8	Reamer	Standard	5set	1:5
9	Steel rule	30mm,50mm,60mm and 100mm	5	1:5
10	Meter tape/Tape rule	3m and 5m	5	1:5
11	Vernier caliper	0.05mm and 0.02mm accuracy	5	1:5
12	Micrometers	0-25mm,25-50mm,50-75mm,etc.	5	1:5
13	Laying out tools	STD.	5	1:5
14	Hammer	Ball pin, cross pin, setting hammers	5	1:5
15	Bench vice	Standard	25	1:1
16	Personal protective equipment	STD	25	1:1
17	Clamps	STD	5	1:5

LEARNING MODULE 06
TVET-PROGRAMME TITLE: **MECHANICS Level I**
MODULE TITLE: **Cutting and Joining Sheet Metal**
MODULE CODE: **IND MCS1 06 0322**
NOMINAL DURATION: **50 Hours**
MODULE DESCRIPTION: This module covers the knowledge, skills and attitudes in applying cutting and joining sheet metal using variety standard techniques, and tools and equipment.
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1.**Plan and prepare work **LO2.** Cut and join sheet metal **LO3**. Quality assure work and clean up
MODULE CONTENTS: **LO1. Plan and prepare work** 1.1 Adhering OHS requirements 1.2 Planning and sequencing tasks 1.3 Selecting and checking tools, equipment and materials 1.4 Preparing work area 1.5 Checking sealants, fixing and sheet metal materials **LO2. Cut and join sheet metal** 2.1 Preparing and cleaning surface 2.2 Marking out sheet metal 2.3 Cutting sheet metal to pattern 2.4 Joining sheet metal **LO3**. **Quality assure work and clean up** 3.1 Identifying quality assurance requirements and adhering 3.2 Inspecting and measuring aligned, joined and sealed components 3.3 Cleaning, checking, maintaining and storing work area, tools and equipment 3.4 Completing documentation

Learning Methods:				
For none impaired trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in **Audio/video** ❖ Organize the class room seating arrangement to be accessible to trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop
Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ rovide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ rovide tutorial support (if necessary)	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist ❖ Conduct close follow up ❖ rovide tutorial support (if necessary

Group discussion	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Brief the thematic issues of the work	❖ Use sign language interpreters ❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Inform the group members to speak loudly	❖ Introduce the trainees with their peers
Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary
Individual assignment	❖ prepare the assignment questions in large text ❖ Encourage the trainees to prepare and submit the assignment in large texts ❖ Make available recorded assignment questions ❖ Facilitate the trainees to prepare and submit the assignment in soft or hard copy	❖ Use sign language interpreter ❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	

ASSESSMENT METHODS:				
Interview		❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges
Written test	❖ Prepare the exam in large texts ❖ Use interview as an option if necessary ❖ Prepare the exam in audio format ❖ Assign human reader ❖ (if necessary) ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, true or false, matching and short answers if necessary.	❖ Use oral response as an option to give answer for trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration /Observation	❖ Brief the instruction or provide them in large text ❖ Time extension	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

ASSESSMENT CRITERIA:

LO.1 Plan and prepare work

- OHS requirements associated with cutting and joining sheet metal, and the workplace environment, are adhered to throughout the work
- Tasks are planned and sequenced in conjunction with others involved or affected by the work
- Tools, equipment and materials, including personal safety equipment, are selected and checked for serviceability and compliance with plans/specifications
- Work area is prepared to support the efficient cutting and joining of sheet metal
- Sealants, fixing and sheet metal materials are checked for compatibility and appropriateness for the job

LO.2 Cut and join sheet metal

- Surface is prepared and cleaned of grease and other contaminants
- Sheet metal is marked out in accordance with plans/specifications
- Sheet metal is cut to pattern and measured using appropriate cutting tools and according to specifications
- Sheet metal is joined to comply with plans/specifications, avoiding damage to all surrounding surfaces

LO.3 Quality assure work and clean up

- Quality assurance requirements are identified and adhered based on task specifications
- Aligned, joined and sealed components are visually inspected and measured according to specifications
- Work area, tools and equipment are cleaned, checked, maintained and stored in accordance with regulations and procedures
- Documentation is completed in accordance with workplace requirements

Annex: Resource Requirements

IND MCS1 06 0322 Cut and join sheet metal				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	***Learning Materials***			
1.	TTLM	TTTLM prepared by the trainer	25	1;1
2.	Reference Books	Sheet metal work Dr marcus bowman	5	1:5
4.	Journals/Publication/Magazines			
B.	***Learning Facilities & Infrastructure***			
1.	Lecture room / work shop	Suitable for training	-	-
2.	Library	With sufficient books	-	-
3.	Industry	Sufficient equipment	-	-
C.	***Consumable Materials***			
1	Copy paper	A4 size	1 pack	1:25
2	G.I. sheet	Standard as required		
3	Stainless sheet	Standard as required		
4	Galvanized sheet	Standard as required		
5	Mechanical pencils	Standard as required		
6	Aluminum sheet	Standard as required		
7	Galvanized sheet	Standard as required		
8	Brush for adhesive applying	Standard as required		
D.	***Tools and equipment's***			
1	Tape rule	3 meter & 5 meter	5	1:5
2	Hand shear	Standard as required	5	1:5
3	Steel rule	500X1000(mm), etc	25	1:1
4	Scriber	Standard as required	25	1:1
5	Snip	Standard as required	25	1:1
6	Ball pin Hammer	Standard as required	25	1:1
7	Mallet Hammer	Rubber and plastic	25	1:1
8	Stake and stake holder	Standard as required	5	1:5
9	Chisel	Standard as required	25	1:1
10	Hand Groove	Standard as required	5	1:5
11	Hand Seaming	Standard as required	5	1:5
12	Rivet set	Standard as required	5	1:5
13	Punch	Standard as required	5	1:5
14	Personal protective equipment	Standard as required	25	1:1
15	Iron scissors	Standard as required	25	1:1
16	hand shear	Standard as required	25	1:1

17	Nibbler	Standard as required	25	1:1

LEARNING MODULE 07

TVET-PROGRAMME TITLE: **Mechanics Level I**

MODULE TITLE: **Operating Basic Workshop Machinery**

MODULE CODE: **IND MCS1 M07 0322**

NOMINAL DURATION: **75 Hours**

MODULE DESCRIPTION: This module covers the knowledge, skills and attitudes required in using workshop machines in fabrication and assembly of metals.

LEARNING OUTCOMES

At the end of the module the trainee will be able to:

LO1. Identify machine shop procedures for occupational health and safety
LO2. Determine and plan job requirements
LO3. Set-up machine
LO4. Perform machine operations
LO 5. Quality assure finished component

MODULE CONTENTS:

LO1. Identify machine shop procedures for occupational health and safety

1.1. Personnel Protective Equipment (PPE)
1.2. Demonstrating preventative OHS
1.3. Managing machine shop standards and regulations

LO2. Determine and plan job requirements

2.1 Analyzing and selecting work requirements.
2.2 Selecting appropriate machine and tools.
2.3 Determining Sequence of operations.

LO3. Set-up machine

3.1 Inspecting and sharpening tools.
3.2 Mounting and positioning tools within machine specifications.
3.3 Setting and adjusting guards and accessories.
3.4 Calculating speeds and feeds
3.5 Using appropriate mathematical techniques and reference material.
3.6 Performing setup operations using safety measures.

LO4. Perform machine operations

4.1 Mounting and securing materials to be machine.
4.2 Using clamping devices appropriate to the work requirements.
4.3 Operating machine correctly.
4.4 Performing operations.
4.5 Applying safety procedures and using personal protective devices.

LO 5. Quality assure finished component

5.1 Checking component for conformance to specifications and predetermining finish.
5.2 Using measuring tools in checking conformance.
5.3 Handling deviations appropriately.
5.4 Caring out routine maintenance and adjustments.

Learning Methods:				
For none impaired trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in **Audio/video** ❖ Organize the class room seating arrangement to be accessible to trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop
Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ rovide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ rovide tutorial support (if necessary)	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist ❖ Conduct close follow up ❖ rovide tutorial support (if necessary
Group discussion	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Use sign language interpreters ❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up	❖ Introduce the trainees with their peers

	❖ Brief the thematic issues of the work	group member	❖ Introduce the trainees with other group member ❖ Inform the group members to speak loudly	
Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary
Individual assignment	❖ prepare the assignment questions in large text ❖ Encourage the trainees to prepare and submit the assignment in large texts ❖ Make available recorded assignment questions ❖ Facilitate the trainees to prepare and submit the assignment in soft or hard copy	❖ Use sign language interpreter ❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	

ASSESSMENT METHODS:				
Interview		❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges
Written test	❖ Prepare the exam in large texts ❖ Use interview as an option if necessary ❖ Prepare the exam in audio format ❖ Assign human reader ❖ (if necessary) ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, true or false, matching and short answers if necessary.	❖ Use oral response as an option to give answer for trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration/ Observation	❖ Brief the instruction or provide them in large text ❖ Time extension	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

ASSESSMENT CRITERIA:

LO.1 Identify machine shop procedures for occupational health and safety.

- Personnel Protective Equipment (PPE) issues are raised with designated personnel in accordance with machine shop safety procedures and relevant OHS legislation.
- Preventative OHS procedures are demonstrated throughout all scope of work, and with regards to machine shop standards and regulations
- Machine shop safety regulation is managed by the individual and maintained with reference to OHS standards and work instructions for the machine shop.

LO.2 Determine and plan job requirements

- Work requirements are analyzed and selected from work instructions and drawings/diagram
- Appropriate machine and tools are selected based on work requirements
- Sequence of operations is determined for maximum efficiency and to meet work requirements and specifications.

LO.3 Set-up machine

- Tools are inspected and if necessary sharpened according to the work requirements
- Tools are mounted and positioned within machine specifications
- Guards and accessories are set and adjusted as required
- Speeds and feeds are calculated using appropriate mathematical techniques and reference material.
- Setup operations are performed following correct/standard procedures and applying safety measures.

LO.4 Perform machine operations

- Materials to be machined is mounted and secured using clamping devices appropriate to the work requirements
- Machine is operated correctly to suit work and material requirements.
- Operations are performed applying safety procedures and using personal protective devices.

LO. 5 Quality assure finished component

- Component is checked for conformance to specifications and predetermined finish in accordance with given standards.
- Appropriate techniques, measuring tools and equipment are used in checking conformance.
- Deviations are handled appropriately in accordance with organization procedures and standard.
- Routine maintenance and adjustments are carried out based on machine inspection plan

Annex: Resource Requirements

IND MCS1 M07 0322 Operating Basic Workshop Machinery				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	***Learning Materials***			
1.	TTLM	TTTLM prepared by the trainer	25	1:1
2.	Reference Books	-Workshop process, practice and materials First edition published by Newnes 1979 Fourth edition published by Routledge 2010	5	1:5
3.1	Textbooks			
4.	Journals/Publication/Magazines			
B.	***Learning Facilities & Infrastructure***			
1.	Lecture Room	6*8m	1	1:25
2.	Machine shop	10x15m	1	1:25
3.	Library	20x20	1	1:25
C.	***Consumable Materials***			
1.	Aluminum ingot	Ø40x150mm	25pcs	1:1
2	Aluminum ingot	Ø60x150mm	25pcs	1:1
3	Round bar (mild steel)	Ø30x6000mm	1 pcs	1:5
4	HSS cutters	12x12x200mm	5 pcs	1:5
5	Carbide cutter	Inserted tips	5 pcs	1:5
6	Drill bitts	Ø6-32mm	2sets	1:5
7	Boring tools	STD	5pcs	1:5
8	Milling cutters	STD	5	1:5
9	Reamers	STD	5	1:5
10	Knurling tools	Diamond shape	5pcs	1:5
D.	***Tools and Equipments***			
1.	Lathe machines	Center/engine lathe	5	1:5
2	Milling machines	Vertical, horizontal and/or universal	5	1:5
3	Radial arm drill machine		5	1:5
4	Chucks	3 jaw, 4 jaw	5pcs	1:5
5	Lathe Centers	Live	5pcs	1:5
6	Clamps,	STD	5	1:5
7	Machine vises	Universal type	5	1:5
8	Angle plates	STD	5	1:5
9	Vernier caliper	STD	5	1:5
10	Micrometer caliper	STD	5	1:5
11	Drill chuck	STD	5	1:5
12	Dial gauge	STD	5	1:5

13	V-Block	STD	5	1:5

LEARNING MODULE 08

TVET-PROGRAMME TITLE: **Mechanics Level I**

MODULE TITLE: **Performing Hand Forging**

MODULE CODE: **IND MCS1 M08 0322**

NOMINAL DURATION: **45 Hours**

MODULE DESCRIPTION: This module covers the knowledge, skills and attitudes required to using hand tools and formers, applying hand forging techniques and operating heat treatment equipment.

LEARNING OUTCOMES

At the end of the module the trainee will be able to:

LO1. Identify forging work shop procedures for occupational health and safety
LO2. Analyze and plan hand forging work
LO3. Perform hand forging techniques
LO4. Quality assure work

MODULE CONTENTS:

LO1. Identify forging work shop procedures for occupational health and safety

1.1 Raising Personnel Protective Equipment (PPE)
1.2 Demonstrating preventative OHS procedures.
1.3 Managing forging shop safety regulation

LO2. Analyze and plan hand forging work

2.1. Interpreting drawing for swaging, bending, upsetting technique
2.2. Selecting hand tools and formers.
2.3. Applying forging temperatures and heat specifications..

LO3. Perform hand forging techniques

3.1 Setting up and operating Heating equipment.
3.2 Applying and carrying aappropriate forging techniques.
3.3 Making allowance for materials shrinkage and oxidization.

LO4. Quality assure work

4.1 Operating equipment
4.2 Controlling heat to specified areas as per instruction
4.3 Measuring form and shape by applying standard devices
4.4 Following Occupational Health and Safety (OHS) measures and procedures.

Learning Methods:				
For none impaired trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in **Audio/video** ❖ Organize the class room seating arrangement to be accessible to trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop
Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ rovide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ rovide tutorial support (if necessary)	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist ❖ Conduct close follow up ❖ rovide tutorial support (if necessary

Group discussion	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Brief the thematic issues of the work	❖ Use sign language interpreters ❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Inform the group members to speak loudly	❖ Introduce the trainees with their peers
Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary
Individual assignment	❖ prepare the assignment questions in large text ❖ Encourage the trainees to prepare and submit the assignment in large texts ❖ Make available recorded assignment questions ❖ Facilitate the trainees to prepare and submit the assignment in soft or hard copy	❖ Use sign language interpreter ❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	
ASSESSMENT METHODS:				
Interview		❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges
Written test	❖ Prepare the exam in large texts ❖ Use interview as an option if necessary ❖ Prepare the exam in audio format	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing	❖ Prepare the exam using short sentences, multiple choices, true or false, matching and short answers if necessary.	❖ Use oral response as an option to give answer for

	❖ Assign human reader ❖ (if necessary) ❖ Time extension	❖ Time extension		trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration/Observation	❖ Brief the instruction or provide them in large text ❖ Time extension	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

ASSESSMENT CRITERIA:

LO1. Identify forging work shop procedures for occupational health and safety

- Personnel Protective Equipment (PPE) issues are raised with designated personnel in accordance with forging workplace procedures and relevant OHS legislation.
- Preventative OHS procedures are demonstrated throughout all scope of forging work, and with regards to forging workplace standards and regulations
- Forging shop safety regulation is managed by the individual and maintained with reference to OHS standards and work instructions for the work shop.

LO2. Analyze and plan hand forging work

- Drawing is interpreted for swaging, bending, upsetting, spreading, punching and drifting techniques is in compliance with specification.
- Hand tools and formers are selected for required forging techniques.
- Forging temperatures and heat specifications are applied to for various materials requirement
- Work plan is drafted according to specifications

LO3. Perform hand forging techniques

- Heating equipment is set up and operated correctly.
- Appropriate forging techniques are applied and carried out in accordance with safety procedures
- Allowance is made for materials shrinkage and oxidization

LO4. Quality assure work

- Equipment is operated in a manner that minimizes oxidization in accordance with operational procedures
- Heat is controlled to specified areas as per instruction
- Form and shape are measured by applying standard devices
- Occupational Health and Safety (OHS) measures and procedures are followed throughout the process

Annex: Resource Requirements

IND MCS1 M08 0322 Perform Hand Forging				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	***Learning Materials***			
1.	TTLM	TTTLM prepared by the trainer	25	1:1
2.	Textbooks			
3.	Reference Books	-Hand forging and wrought iron ornamental work By: Thomas Francis Googerty	5	1:5
4.	Journals/Publication/Magazines			
B.	***Learning Facilities & Infrastructure***			
1.	Lecture Room	6*8m	1	1:25
2.	Machine shop	7x5m	1	1:25
3.	Library	20x20	1	1:25
C.	***Consumable Materials***			
1.	Leather apron	Pcs	25	1:1
2	Leather Glove	Pair	25	1:1
3	Mild steel round bar	Ø16x6000mm	1	1:25
	Mild steel round bar	Ø25x6000mm	1	1:25
4	Mild steel flat bar	8x20x6000mm	1	1:25
5	Mild steel flat bar	10x20x6000mm	1	1:25
6	Wood charcoal	50 Kg	As required	1:5
D.	***Tools and Equipments***			
1.	Anvil	60kg	5	1:5
2	Hammers(set hammers, ball peen, sledge)	STD	25	1:1
3	Forge Vices	STD	5	1:5
4	Hardy	STD	5	1:5
5	Flatters	STD	5	1:5
6	Fuller	STD	5	1:5
7	Swages	STD	5	1:5
8	measuring tools	STD	5	1:5
9	Tong different type	STD	5	1:5
10	hot/cold sets	STD	5	1:5
11	other hand/power tools	STD	5	1:5
12	Swages block	STD	5	1:5

13	Black smith furnace	STD	5	1:5

LEARNING MODULE 09
TVET-PROGRAMME TITLE: **MECHANICS Level I**
MODULE TITLE: **Performing Welding and Cutting Using Oxyacetylene**
MODULE CODE: **IND MCS1 M09 0322**
NOMINAL DURATION: **80 Hours**
MODULE DESCRIPTION: This module covers the skill, knowledge and attitudes required to in performing oxyacetylene cutting and welding in fabrication and assembly of metals.
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1.** Prepare Oxyacetylene welding and cutting equipment's and apply OHS in work shop **LO2.** Set up oxyacetylene welding and cutting outfit **LO3**. Weld and Cut materials with Oxy acetylene
MODULE CONTENTS: **LO1.** Prepare Oxyacetylene welding and cutting equipment's and apply OHS in work shop 1.1 Designating personnel protective equipment (PPE) 1.2 Demonstrating preventative OHS procedures 1.3 Selecting and preparing welding and cutting equipment and consumables 1.4 Preparing materials **LO2.** Set up oxyacetylene welding and cutting outfit 3.1 Interpreting instructions, symbols, specifications 3.2 Assembling cutting equipment 3.3 Assembling welding and cutting equipment 3.4 Preparing materials **LO3**. Weld and Cut materials with Oxy acetylene 4.1 Fuel gas properties and applications 4.2 Following cutting and welding procedures 4.3 Cutting and welding materials. 4.4 Inspecting and releasing cut components

Learning Methods:				
For none impaired trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in **Audio/video** ❖ Organize the class room seating arrangement to be accessible to trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop
Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ rovide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ rovide tutorial support (if necessary)	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist ❖ Conduct close follow up ❖ rovide tutorial support (if necessary
Group discussion	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Use sign language interpreters ❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up	❖ Introduce the trainees with their peers

	❖ Brief the thematic issues of the work	group member	❖ Introduce the trainees with other group member ❖ Inform the group members to speak loudly	
Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary
Individual assignment	❖ prepare the assignment questions in large text ❖ Encourage the trainees to prepare and submit the assignment in large texts ❖ Make available recorded assignment questions ❖ Facilitate the trainees to prepare and submit the assignment in soft or hard copy	❖ Use sign language interpreter ❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	

ASSESSMENT METHODS:				
Interview		❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges
Written test	❖ Prepare the exam in large texts ❖ Use interview as an option if necessary ❖ Prepare the exam in audio format ❖ Assign human reader ❖ (if necessary) ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, true or false, matching and short answers if necessary.	❖ Use oral response as an option to give answer for trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration/ Observation	❖ Brief the instruction or provide them in large text ❖ Time extension	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

ASSESSMENT CRITERIA:

LO.1 Prepare Oxyacetylene welding and cutting equipment's and apply OHS in work shop

- Personnel Protective Equipment (PPE) issues are raised with designated personnel in accordance with Oxyacetylene cutting workplace procedures and relevant OHS legislation.
- Preventative OHS procedures are demonstrated throughout all scope of Oxyacetylene cutting work, and with regards to Oxyacetylene cutting workplace standards and regulations
- Welding and Cutting equipment and consumables are selected and prepared according to job requirements
- Materials are prepared to achieve required cutting specification

LO.2 Set up oxyacetylene welding and cutting outfit

- Instructions, symbols, specifications including bead size, bead placement, reinforcement etc. are interpreted correctly in accordance with cutting procedure sheet, if available, and standard operating procedures.
- Cutting equipment including cylinders, regulators, hoses, torches and tips are assembled and set up safely in accordance with standard operating procedures.
- Welding and cutting equipment, including cylinders, regulators, hoses, torches and tips are assembled and set up safely in accordance with standard operating procedures
- Materials are prepared to achieve required weld specification

LO.3 Weld and Cut materials with Oxy acetylene

- Cutting and welding procedures are followed according to regulations
- Materials are welded and cut in all positions according to standards.
- Cut components are quality inspected and released due to standard and procedures .

Annex: Resource Requirements

IND MCS1 M09 0322 Performing welding and Cutting Using Oxyacetylene				
Item No.	Category/Item	Description/ Specifications	Quantity (pc./participant)	Recommended Ratio (Item: Trainee)
A.	**Learning Materials**			
1	TTLM	To be Prepared by Trainers	25	1:1
2	Textbook	any book related to oxy-acetylene welding and cutting	5	1:5
3	Reference book	-Oxyfuel Gas Welding Kevin E Bowditch, Mark A Bowditch	5	1:5
B.	**Learning Facilities & Infrastructure**			
1	Classroom library, workshop Chalk board/ white board/ Green board, Sample documents, Written materials,	STD	To be sufficient as required	1:25
C.	**Consumable Materials**			
1	Copy paper	A4 size	25	1:1
2	Low carbon steel plate	6000x60x(4-12)mm thick	5 Pcs each	1:5
3	Low carbon steel pipe	Ø 50-60x3mm thick	5 Pcs each	1:5
4	Low carbon round bar	Ø 20-40x6000mm	5 Pcs each	1:5
	Filler rode	Ø2-6mm	10	1:5
5	Oxygen and Acetylene Gas			
D.	**Tools and Equipment**			
1	Meter tape/ Tape rule	3 m,5m	5	1:5
2	Hammer	Chipping	5	1:5
3	Tip cleaner	Different size	5 set	1:5
4	Personal protective equipment	Goggle, helmet, Lather apron, safety shoe, glove, over all etc.	25	1:1
1	acetylene Generator	STD	5	1:5
2	Oxygen cylinder	STD	5	1:5
3	Acetylene cylinder	STD	5	1:5
4	Oxygen Regulator	STD	5	1:5
5	Acetylene Regulator	STD	5	1:5
6	Cutting torch	STD	5	1:5
7	Hose for oxygen gas	STD	5	1:5
8	Hose for acetylene gas	STD	5	1:5
9	Welding torch	STD	5	1:5

LEARNING MODULE 10
TVET-PROGRAMME TITLE: **MECHANICS Level I**
MODULE TITLE: **Performing Routine Metal Arc Welding**
MODULE CODE: **IND MCS1 M10 0322**
NOMINAL DURATION: **65 Hours**
MODULE DESCRIPTION: This module covers the skills, attitudes and knowledge required in preparing the materials and carrying out routine Manual Metal Arc Welding (MMAW).
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1.** Plan and prepare welding work **LO2.** Perform welding Practices **LO3.** Assure quality and clean up
MODULE CONTENTS: **LO1.** Plan and prepare welding work 1.1.Identifying welding requirements 1.2 Selecting material and appropriate welding equipment **LO2.** Perform welding Practices 2.1 Set up welding currency 2.2 Selecting electrode 2.3 Cleaning and preparing Materials 2.4 Welding material 2.5 Cleaning welding seams 2.6 Following and applying OHS measures 2.7 using and application of personal protective equipment **LO3**. Assure quality and clean up 3.1.Cleaning and inspecting welding seams 3.2.Encouraging feedback on performance provided by others in the team 3.3.Measuring joins 3.4. Cleaning and maintaining welding equipment and work area 3.5. Post-welding treatments

Learning Methods:				
For none impaired trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in **Audio/video** ❖ Organize the class room seating arrangement to be accessible to trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop
Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ rovide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ rovide tutorial support (if necessary)	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist ❖ Conduct close follow up ❖ rovide tutorial support (if necessary
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	❖ Brief the thematic issues of the work	group member	❖ Introduce the trainees with other group member ❖ Inform the group members to speak loudly	
Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary
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ASSESSMENT METHODS:				
Interview		❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges
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ASSESSMENT CRITERIA:

LO.1 Plan and prepare welding work

- Welding requirements are identified from work instructions and drawing
- Materials and appropriate welding equipment are selected based on norms and regulations

LO.2 Perform welding Practices

- Welding currency is set up correctly according to standard
- Electrodes are selected to suit application and standard settings
- Materials are cleaned and prepared based on procedures
- Materials are welded to job requirements and instructions
- Welding seams are cleaned in accordance with operating procedures
- OHS measures are followed and applied throughout welding activities

LO.3 Assure quality and clean up

- Welding seams are cleaned and inspected in accordance with operating procedures
- Feedback on performance provided by others in the team is encouraged, acknowledged and acted upon
- Joins are measured according to specification
- Welding equipment and work area are cleaned and maintained after welding activity

Annex: Resource Requirements

IND MCS1 M10 0322 Performing Routine Metal Arc Welding				
Item No.	Category/Item	Description/ Specifications	Quantity (pc./participant)	Recommended Ratio (Item: Trainee)
A. Learning Materials				
1	TTLM	To be Prepared by Trainers	25	1:1
2	Textbook	--	--	--
3	Reference book	-Practical Welding (Motivate Series) by Gibson, Stuart W. published by Macmillan Education (1994)	5	1:5
B. Learning Facilities & Infrastructure				
1	Classroom library ,workshop, Chalk board/ white board/ Green board, Sample documents, Written materials, Reference	To be sufficient as required	1	1:25
2	books, illustrations, Good classroom environment	To be sufficient as required		
C. Consumable Materials				
1	Copy paper	A4 size	25	25:1
2	Rags	as required		
3	Welding electrode	E6013 Ø 2.5mm & Ø 3.2mm	3 kg each	1:1
4	Mild steel plate	6000x60x(3-6)mm	10 each	1:1
5	Mild steel sheet	2000x1000x(3-6)mm	5 each	1:1
6	Mild steel Round pipe	Ø (20-40)x1.25mmthick	25 each	1:1
7	Mild steel Square pipe	(20x20)1.25mmthick (25x25) 1.25mmthick (30x30) 1.25mmthick	25 each	1:1
D. Tools and Equipment's				
1	Arc welding machine	AC/DC	5	1:5
2	Hand tools	STD	As required	1:5
3	Personal Protective equipment's	Goggles, Lather Apron, Glove etc.	25	1;1
4	jigs, fixtures, clamps, and grinders etc.	To be sufficient as required	5	1:5
5	Wire brush	Standard	25	1:5
6	Portable grinding machine	/ Makita	5	1:5
7	Chipping hammer	Standard	5	1:5

Acknowledgement

The **Ministry of Labor and Skills** wishes to thank and appreciation for the trainers who donated their effort and time to develop this outcome based curriculum for the TVET program mechanics Level I. We also thank all regional TVET College, Trainers, coordinators and Federal TVET institute programmers for active facilitation for the development of this curriculum.

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