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MINISTRY OF LABOR AND SKILLS

AUTOMOTIVE MECHANICS LEVEL – IV



CURRICULUM

Based on December, 2021 Version - 3 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 Automotive Mechanics Level IV**.**

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

1. TVET-Program Design

1.1. TVET-Program Title: Automotive Mechanics Level -IV

1.2. TVET-Program Description

The Program is designed to develop all the necessary knowledge, skill 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 an Aautomotive Mechanics Level IV with competencies elaborated in the respective OS. Graduates of the program will have the required qualification to work in the Economic Infrastructure sector in the field of Automotive Technology.

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 diagnose engine management systems, Diagnose Power train Management System, Diagnose under Chassis Management Systems, Manage Automotive Workshop and servicing Operations and Prepare Job Estimation and Cost 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:

EIS AUM4 01 1221	Diagnose engine management systems
EIS AUM4 02 1221	Diagnose Power train Management System
EIS AUM4 03 1221	Diagnose Under Chassis Management Systems
EIS AUM4 04 1221	Manage Automotive Workshop and servicing Operations
EIS AUM4 051221	Prepare Job Estimation and Cost

1.4. Duration of the TVET-Program

The Program will have duration of **270 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.	Diagnose engine management systems	18	20	22	60	
2.	Diagnose Power train Management System	18	20	22	60	
3.	Diagnose Under Chassis Management Systems	15	15	20	50	
4.	Manage Automotive Workshop and servicing Operations	15	15	10	40	
5.	Prepare Job Estimation and Cost	25	25	10	60	
Total		91	95	84	270	

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 IV**.**

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 applicant including disabilities who meets the entry requirement items addressed under 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)
EIS AUM4 04 1221 Manage Automotive Workshop and servicing Operations	EIS AUM4 M01 0322 Managing Automotive Workshop and servicing Operations	• Develop operational plan • Plan and manage resource acquisition • Monitor and review operations • Review and evaluate work performance	40
EIS AUM4 01 1221 Diagnose engine management systems	EIS AUM4 M02 0322 Diagnosing engine management systems	• Identify and confirm the work requirement • Prepare to perform diagnosis • Apply complex diagnostic process	60
EIS AUM4 02 1221 Diagnose Power train Management System	EIS AUM4 M03 0322 Diagnosing Power train Management System	• Identify and confirm the work requirement • Prepare to diagnose faults • Apply diagnostic process	60
EIS AUM4 03 1221 Diagnose Under Chassis Management Systems	EIS AUM4 M04 0322 Diagnosing Under Chassis Management Systems	• Identify and confirm the work requirement • Prepare to perform diagnosis • Apply complex diagnostic process	50

EIS AUM4 051221	Prepare Job Estimation and Cost	EIS AUM4 M05 0322	Preparing Job Estimation and Cost	• Gather information • Estimate materials and duration • Calculate costs • Document details	60

*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 is 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 Trainers Profile

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

LEARNING MODULE 01	
TVET-PROGRAMME TITLE:	Automotive Mechanics Level IV
MODULE TITLE:	Managing Automotive Workshop and servicing Operations
MODULE CODE:	**EIS AUM4 M01 0322**
NOMINAL DURATION:	40 hours

MODULE DESCRIPTION: This module covers the knowledge, skill and attitude required to develop and monitor the implementation of the operational plan to provide efficient and effective workplace practices within the organization's productivity and profitability plans. Management at a strategic level requires systems and procedures to be developed and implemented to facilitate the organization's operational plan.

LEARNING OUTCOMES

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

LO1. Develop operational plan

LO2. Plan and manage resource acquisition

LO3. Monitor and review operations

LO4. Review and evaluate work performance

MODULE CONTENTS:

LO1. Develop operational plan

1.1. Resource management systems

1.1.1. Manager

1.1.2. Supervisor

1.1.3. Employee

1.1.4. Materials

1.2. Planning and managing operations

1.3. Consultation and communication

1.4. Contingency planning

LO2. Plan and manage resource acquisition

2.1. Principles and techniques management

2.1.1. Resource planning and acquisition

2.1.2. Budgeting and financial analysis and interpretation

2.1.3. Improving resource usage

2.1.4. Ways of supporting individuals/teams

2.1.5. Feedback mechanism

2.2. Developing organizational policies and strategies

2.2.1. Organizational guidelines

2.2.2. Risk identification, assessment and management

LO3. Monitor and review operations

3.1. Identifying areas for improvements

3.2. Achieving profit and productivity

3.3. Succession planning

LO4. Review and evaluate work performance

4.1. Reviewing work plans and strategies

4.2. Evaluating organization rules and regulations

4.3. Feedback mechanisms

4.3.1. Verbal feedback

4.3.2. Informal feedback

4.3.3. Formal feedback

4.3.4. Questionnaire

4.3.5. Survey

4.3.6. Group discussion

4.4. Documenting and reporting performance appraisal

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	❖ 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

		❖ Summarize main points		
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	❖ Introduce the trainees with their peers

			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	❖ Use sign language interpreter ❖ Brief on the instruction of the	❖ Provide activity based assessment ❖ Brief on the instruction of the exam	❖ Provide activity based assessment

	❖ Time extension	exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Use loud voice ❖ Time extension	❖ Conduct close follow up ❖ Time extension

ASSESSMENT CRITERIA:

LO.1 Develop operational plan

- Resource requirements are researched, analyzed and documented and an operational plan is developed and/or implemented in consultation with relevant personnel, colleagues and specialist resource managers
- Consultation processes are developed and/or implemented as an integral part of the operational planning process
- Operational plans are developed to contribute to the achievement of the organization's performance/business plan
- Details of the operational plan include the development of key performance indicators to measure organizational performance
- Contingency plans are developed and implemented at appropriate stages of operational planning
- The development and presentation of proposals for resource requirements are assisted by a variety of information sources, and specialist advice is sought as required

LO.2 Plan and manage resource acquisition

- Strategies are developed and implemented to ensure that employees are recruited and/or inducted within the organization's human resource management policies and practices
- Strategies are developed and implemented to ensure that physical resources and services are acquired in accordance with the organization's policies, practices and procedures

LO.3 Monitor and review operations

- Performance systems and processes are developed, monitored and reviewed to assess progress in achieving profit and productivity plans and targets
- Budget and actual financial information is analyzed and interpreted to monitor and review profit and productivity performance

- Areas of underperformance are identified, solutions recommended, and prompt action is taken to rectify the situation
- Systems are planned and implemented to ensure that mentoring and coaching are provided to support individuals and teams to use resources effectively, economically and safely
- Recommendations for variations to operational plans are negotiated and approved by designated persons/groups
- Systems are developed and implemented to ensure that procedures and records associated with documenting performance are managed in accordance with the organization's requirements

LO.4 Review and evaluate work performance

- Work plans, strategies and implementation are reviewed based on accurate, relevant and current information
- Review is based on comprehensive consultation with appropriate personnel on outcomes of work plans and reliable feedback
- Results of review are provided to concerned parties and formed as the basis for adjustments/simplifications to be made to policies, processes and activities
- Performance appraisal is conducted in accordance with organization rules and regulations
- Performance appraisal report is prepared and documented regularly as per organization requirements.
- Recommendations are prepared and presented to appropriate personnel/authorities
- Feedback mechanisms are implemented in line with organization policies

Annex: Resource Requirements

EIS AUM4 M01 0322	Managing Automotive Workshop and servicing Operations			
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	***Learning Materials***			
1.	TTLM	Prepared by ministry of labor and skills	5 Pcs	1:5
2.	***Reference Books***			
2.1	Industrial Engineering: Operations Management	November 20, 2020 by Mario Fernández (Author)	5 Pcs	1:5
2.2	The Encyclopedia of Operations Management 1st Edition	by Arthur V. Hill (Author)	5 Pcs	1:5
2.3	Operations Management	May 31, 2013 by Inc. BarCharts (Author)	5 Pcs	1:5
4.	Journals/Publication/Magazines			
B.	***Learning Facilities & Infrastructure***			
1.	Class room	For lecture in (m^2)	1 Pcs	6:5
2.	Work shop	For practical activity (m^2)	1 Pcs	4:1
C.	***Consumable Materials***			
D.	***Tools and Equipments***			

LEARNING MODULE 02	
TVET-PROGRAMME TITLE:	Automotive Mechanics Level IV
MODULE TITLE :	Diagnosing Engine Management Systems
MODULE CODE :	EIS AUM4 M02 0322
NOMINAL DURATION :	60 hours

MODULE DESCRIPTION : This module covers the knowledge, attitudes and skills and attitude required to perform fault diagnosis in automotive gasoline and diesel engines management in order to initiate action to service, repair, replace or improve performance. Faults may be mechanical, electrical, and electronic or fuel related by nature that require the application of complex diagnostic processes.

LEARNING OUTCOMES

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

LO1. Identify and Confirm the Work Requirement

LO2. Prepare To Perform Diagnosis

LO3. Apply Complex Diagnostic Process

MODULE CONTENTS:

LO1. Identify and confirm the work requirement

1.1. Determining the nature and scope of diagnosis system

1.1.1. Common faults

1.1.2. Diagnostic process

1.2. Interpreting petrol and diesel engines' management

1.3. Workplace Health and Safety (WHS) requirements

LO2. Prepare to perform diagnosis

2.1 Developing and adopting diagnostic criteria

2.2 Selecting diagnostic test methods and sequences

2.3 Analyzing on-board diagnostic

2.4 Identifying diagnostic tools and testing equipment

2.41. Scan tools

2.42. Oscilloscope

2.43. Compression testers

2.44. Cylinder leakage tester

LO3. Apply complex diagnostic process

3.1. Six-step troubleshooting plan

3.2. Discover-investigate-fix methodology

3.3. Diagnostic flow char

3.4. Black box diagnosis

3.5. Concluding findings and test results

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	❖ 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

		❖ Present the lecture in video format ❖ Summarize main points		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	❖ Conduct close follow up and	❖ Conduct close	❖ Assign peer

	❖ Provide tutorial support if necessary ❖ provide special attention in the process	guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	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.1Identify and confirm the work requirement

- Workplace instructions and compliant reports are used to determine the nature and scope of system diagnosis
- Specifications for correct operation of petrol and diesel engines' management systems are accessed and interpreted
- Workplace Health and Safety (WHS) requirements, including equipment, system isolation and personal protection needs, are observed throughout the work
- systemic deficiencies, discrepancies or faults on engine management operation performance are identified and confirmed from indirect or direct evidence
- Possible safety impacts of the work are considered and responded according to regulatory and workplace procedures

LO.2 Prepare to perform diagnosis

- Criteria for diagnosis are developed and adopted to meet the objective of the work
- System performance achievements or discrepancies are identified from analysis of technical support information and available on-board diagnostic systems
- Diagnostic test methods and sequences are selected from the range of available options
- Testing equipment is prepared for application according to manufacturer, component supplier and workplace requirements
- Tools and materials required to support the diagnostic process are identified and prepared for use

LO.3Apply complex diagnostic process

- Selected diagnostic processes are followed according to specifications and workplace procedures
- Testing is carried out according to workplace procedures and manufacturer and component supplier specifications
- Findings are verified by using reliable alternative or optional processes
- Conclusions are drawn from findings and documented according to workplace requirements
- Detailed information of diagnostic findings is provided to the responsible person in charge of repairing

Annex: Resource Requirements

EIS AUM4 M02 0322	Overhauling Conventional and electronics Fuel System Components			
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	***Learning Materials***			
1.	TTLM	Prepared by ministry of labor and skills	1 Psc	1:5
2.	Reference Books			
•	Automotive technology A Systems Approach 7th Edition	Jack Erjavec Rob Thompson	1 Psc	1:5
•	Auto motive mechanics 10th edition	William H.Crouse	1 Psc	1:5
•	Automobile Engineering	G.B.S. NARANG	1 Psc	1:5
•	Automobile engineering	R.K Rajput	1 Psc	1:5
•	Auto motive mechanics 10th edition	William H.Crouse	1 Psc	1:5
4.	Journals/Publication/Magazines			
B.	***Learning Facilities & Infrastructure***			
3.	Class room	Standard	1 Psc	1:25
4.	White board / black board	240mX120m	1 Psc	1:25
5.	Stool chair	55cmX100cmX70cm	1 Psc	1:1
6.	Work shop	Standard	25 Psc	1:1
C.	***Consumable Materials***			
7.	Rag	Cotton	5 Psc	1:5
8.	Engine Oil	API, SAE	5 liters	1:25
9.	Fuel	Gasoline	5 liters	1:25
10.	Fuel	Diesel	5 liters	1:25
D.	***Tools and Equipments***			
2.4.1	Compression testers	CO_2, foam	5 Psc	1:5
2.4.2	Cylinder leakage tester	Chrome	25 Psc	1:1

2.4.3	Scan tools	Inside, outside	25 Psc	1:1
2.4.4	Coolingsystem analyzer	All in one	25 Psc	1:1
2.4.5	Exhaust gas analyzer	Puller, Extractor	5 Psc	1:5
2.4.6	Oscilloscope	220 v portable	5 Psc	1:5
2.4.7	Fuelpressure gauges	Standard	5 Psc	1:5
	Stethoscope	Std	5 Psc	1:5
2.5	Temperaturegauges	Std	1 Psc	1:5
2.6	Tachometer	Std	1 Pcs	1:5
	Timing lights	Std	5 Psc	1:5
	vacuum gauges and leak detectors	Std	5 Psc	1:5
	Computer memory saver	Std	5 Psc	1:5
	Injectorbalance tester	Std	5 Psc	1:5
	Sparktester	Std	5 Psc	1:5
	Engine analyzer	Electronic fuel inj.	5 Psc	1:5
2.7	Gasoline engine	Conventional	2 pcs	1:5
2.8	Diesel engine	Electronic fuel inj.	2 pcs	1:5

LEARNING MODULE 03	
TVET-PROGRAMME TITLE:	Automotive Mechanics Level IV
MODULE TITLE:	Diagnosing power train management systems
MODULE CODE:	**EIS AUM4 M03 0322**
NOMINAL DURATION:	60 hours

MODULE DESCRIPTION: This module covers the knowledge, skill and attitude required to diagnose faults in power train management systems in order to initiate action to service, repair, replace or improve performance. Faults may be mechanical, electrical, and electronic or fuel related by nature that require the application of diagnostic processes.

LEARNING OUTCOMES

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

LO1. Identify and confirm the work requirement

LO2. Prepare to diagnose faults

LO3. Apply diagnostic process

MODULE CONTENTS:

LO1. Identify and confirm the work requirement

1.1. Determining the nature and scope of system diagnosis

1.1.1. Common faults

1.1.2. Diagnostic processes

1.2. Accessing and interpreting power train management system

1.2.1. Electronically controlled automatic transmissions

1.2.2. Electronically controlled driveline systems

1.3. Observing workplace health and safety

LO2. Prepare to diagnose faults

2.1 .Developing and adopting Criteria for diagnosis

2.2 Preparing on-board diagnostic

2.3 Accessing and interpreting information

2.4 Selecting diagnostic test methods and sequences

2.5 Diagnostic Tools and equipment

LO3. Apply diagnostic process

3.1. Six-step troubleshooting plan

3.2. Discover-investigate-fix methodology

3.3. Diagnostic flow char

3.4.	Black box diagnosis
3.5.	Concluding findings and test results
3.6.	Cleaning and storing 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	❖ 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

		❖ Summarize main points		
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 ❖ provide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees provide 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 ❖ Provide 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	❖ Introduce the trainees with their peers

			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	❖ Use sign language interpreter ❖ Brief on the instruction of the	❖ Provide activity based assessment ❖ Brief on the instruction of the exam	❖ Provide activity based assessment

	❖ Time extension	exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Use loud voice ❖ Time extension	❖ Conduct close follow up ❖ Time extension

ASSESSMENT CRITERIA:

1. **LO.1 Identify and confirm the work requirement**
   - Workplace instructions and compliant reports are used to determine the nature and scope of system diagnosis
   - Specifications for correctly functioning power train management system are accessed and interpreted
   - Workplace Health and Safety (WHS) requirements, including equipment, system isolation and personal protection needs, are observed throughout the work
   - systemic deficiencies, discrepancies or faults on engine management operation performance are identified and confirmed from indirect or direct evidence
   - Possible safety impacts of the work are considered and responded according to OHS procedures
2. **LO.2. Prepare to diagnose faults**
   - Criteria for diagnosis are developed and adopted to meet the objective of the work
   - System performance achievements or discrepancies are identified from analysis of technical support information and available on-board diagnostic systems
   - Correct information is accessed and interpreted from appropriate manufacturer specifications and manual
   - Diagnostic test methods and sequences are selected from the range of available options
   - Testing equipment is prepared for application according to manufacturer, component supplier and workplace requirements
   - Tools and materials required to support the diagnostic process are identified and prepared for use

LO.3 Apply diagnostic process

- Selected diagnostic processes are followed according to specifications and workplace procedures
- Testing is carried out according to workplace procedures and manufacturer and component supplier specifications
- Findings are verified by using reliable alternative or optional processes
- Conclusions are drawn from findings and documented according to workplace requirements

- Detailed information of diagnostic findings is provided to the responsible person in charge of repairing
- Company standard operating procedures are observed throughout the work
- Tools and equipment are cleaned and stored following safety and standard procedures

Annex: Resource Requirements

EIS AUM4 M03 0322	Diagnosing power train management systems			
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	***Learning Materials***			
1.	TTLM	Prepared by ministry of labor and skills	25 Pcs	1:1
2.	Reference Books			
1	Automotive Technology	7th Edition Jack Erjavec , Rob Thompson	5 Pcs	1:5
2	Automotive engine	6th Edition Tim Gilles	5 Pcs	1:5
3	The Car Care Book	2ND Edition k.venkata reddy	5 Pcs	1:5
3.	Journals/Publication/Magazines			
B.	***Learning Facilities & Infrastructure***			
1.	Class room	31.5 m^2	1 Pcs	1:25
2.	Library	School library	1pcs	1:25
3.	Whiteboard /Blackboard	240 x 120 cm	1pcs	1:25
4.	Arm Chair	55 X 100 x 70	25pcs	1:1
5.	Workshop	100 m^2	1pcs	1:25
6.	LCD/overhead projector	Standard	1pcs	1:25
C.	***Consumable Materials***			
1.	Diesel fuel	Fuel	25liter	1:1
2.	Petrol	Fuel	25liter	1:1
3.	Kerosene	Fuel	5 liter	1:5
3.	Cotton clothe	1meter	5 Pcs	1:5
4.	Sand paper	#100	2pack	1:5

D.	***Tools and Equipments***			
1.	Combination wrench	6mm-32mm	5set	1:5
2	socket wrench	6mm-32mm	5set	1:5
3	Screw driver(flat & Philips)	Standard	5set	1:5
4	Open end wrench	6mm-32mm	5set	1:5
5	scan tools	Analogue	1pcs each	1:25
6	Multimeter	Digital	25 Pcs	1:1
7	Oscilloscope	Suitable any petrol and diesel engine	1pcs each	1:25
8	Wire brush	Metallic	5pcs	1:5
9	Oil can	Metal continuer	5pcs	1:5
10	Stethoscope	Sound Detector	1pcs	1:25

LEARNING MODULE 04	
TVET-PROGRAMME TITLE:	Automotive Mechanic Level IV
MODULE TITLE:	Diagnosing Under Chassis Management Systems
MODULE CODE:	**EIS AUM4 M04 0322**
NOMINAL DURATION:	50 hours

MODULE DESCRIPTION: This module covers the knowledge, skill and attitude required to diagnose faults in automotive braking, traction, integrated stability control, steering and suspension systems in order to initiate action to service, repair, replace or improve performance. Faults may be mechanical, electrical, and electronic or fuel related by nature that require the application of diagnostic processes.

LEARNING OUTCOMES

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

LO1. Identify and confirm the work requirement

LO2. Prepare to perform diagnosis

LO3. Apply complex diagnostic process

MODULE CONTENTS:

LO1. Identify and confirm the work requirement

1.1 Concepts and principles of under chassis management

- **1.1.1.** Mechanical and hydraulic systems
- **1.1.2.** Electrical and electronic systems
- **1.1.3.** Automotive electronically controlled brake
- **1.1.4.** Integrated stability
- **1.1.5.** Electronic Steering and suspension systems

1.2 Determining the nature and scope of system diagnosis

- **1.2.1.** Common faults
- **1.2.2.** Diagnostic processes

1.4. Observing workplace health and safety

LO2. Prepare to perform diagnosis

2.1 Developing and adopting Criteria for diagnosis

2.2 Preparing on-board diagnostic

2.3 Accessing and interpreting information

2.4 Selecting diagnostic test methods and sequences

2.5 Diagnostic Tools and equipment

LO3. Apply complex diagnostic process

- **3.1.** Six-step troubleshooting plan
- **3.2.** Discover-investigate-fix methodology
- **3.3.** Diagnostic flow char
- **3.4.** Black box diagnosis
- **3.5.** Verifying findings and optional processes
- **3.6.** Cleaning and storing 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	❖ 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

		❖ Summarize main points		
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 ❖ Provide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ Provide 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 ❖ Provide tutorial support (if necessary)
Group discussion	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group members ❖ 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 members	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group members ❖ Inform the group members to speak	❖ Introduce the trainees with their peers

			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	❖ Use sign language interpreter ❖ Brief on the instruction of the	❖ Provide activity-based assessment ❖ Brief on the instruction of the exam	❖ Provide activity-based assessment

	❖ Time extension	exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Use loud voice ❖ Time extension	❖ Conduct close follow up ❖ Time extension

ASSESSMENT CRITERIA:

LO.1 Identify and confirm the work requirement

- Workplace instructions and compliant reports are used to determine the nature and scope of system diagnosis
- Specifications for correctly functioning under chassis management system are accessed and interpreted
- Workplace Health and Safety (WHS) requirements, including equipment, system isolation and personal protection needs, are observed throughout the work
- systemic deficiencies, discrepancies or faults on under chassis management operation performance are identified and confirmed from indirect or direct evidence
- Possible safety impacts of the work are considered and responded according to OHS procedures

LO.2 Prepare to perform diagnosis

- Criteria for diagnosis are developed and adopted to meet the objective of the work
- System performance achievements or discrepancies are identified from analysis of technical support information and available on-board diagnostic systems
- Correct information is accessed and interpreted from appropriate manufacturer specifications and manual
- Diagnostic test methods and sequences are selected from the range of available options
- Testing equipment is prepared for application according to manufacturer, component supplier and workplace requirements
- Tools and materials required to support the diagnostic process are identified and prepared for us

LO.3 Apply complex diagnostic process

- Selected diagnostic processes are followed according to specifications and workplace procedures
- Testing is carried out according to workplace procedures and manufacturer and component supplier specifications
- Findings are verified by using reliable alternative or optional processes

- Conclusions are drawn from findings and documented according to workplace requirements
- Detailed information of diagnostic findings is provided to the responsible person in charge of repairing
- Company standard operating procedures are observed throughout the work
- Tools and equipment are cleaned and stored following safety and standard procedures

Annex: Resource Requirements

EIS AUM4 M04 0322	Diagnosing Under Chassis Management Systems			
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	***Learning Materials***			
1.	TTLM	Prepared by ministry of labor and skills	5 Pcs	1:5
2.	***Reference Books***			
2.1	Brakes, Brake Control and Driver Assistance Systems	Prof. Dr.-Ing. Konrad Reif	5 Pcs	1:5
2.2	Automotive Engineering	Edited by David A. Crolla	5 Pcs	1:5
2.3	Automotive technology	5th Edition Jack Erjavec	5 Pcs	1:5
4.	Journals/Publication/Magazines			
B.	***Learning Facilities & Infrastructure***			
C.	***Consumable Materials***			
1	Rag	Cotton	25 kg	1:1
2	Detergent	Liquid	5 L	1:5
3	Brake fluid	Dot 3 /Dot 4	2.5 L	1:5
4	Hydraulic fluid	Steering fluid	5 L	1:5
D.	***Tools and Equipments***			
1.	***Tools***			
	Hand tools	Mechanic tool box	5 Pcs	1:5
	Hammer	Sludge/ ball peen	5 Pcs	1:5
	Hammer	Plastic type	5 Pcs	1:5
	Plier	Combination	5 Pcs	1:5
	Plier	Long nose	5 Pcs	1:5
	Brake special tool	Kit	5 Pcs	1:5
2	***Equipments***			
	Bench	(12 x 2) m	5 Pcs	1:5
	Jack	Floor	5 Pcs	1:5
	Coil spring compressor	Standard	5 Pcs	1:5

LEARNING MODULE 05	
TVET-PROGRAMME TITLE:	Automotive Mechanics Level IV
MODULE TITLE:	Preparing Job Estimation and Cost
MODULE CODE:	**EIS AUM4 M05 0322**
NOMINAL DURATION:	60 hours

MODULE DESCRIPTION: This module covers the knowledge, skill and attitude required to calculate the materials, labor and duration requirements and establish costs for an automotive servicing / repair works.

LEARNING OUTCOMES

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

LO1. Gather information

LO2. Estimate materials and duration

LO3. Calculate costs

LO4. Document details

MODULE CONTENTS:

LO1. Gather information

1.1 Assessing instructions and specifications

1.1.1 Job order check list

1.1.2 Manufacturers' specifications and instructions

1.2 Organization work specifications and requirements

1.3 Materials quality requirements

1.4 Labour and overheads rates

1.5 Automotive trade terminology

LO2. Estimate materials and duration

2.1 Identifying types and quantities of materials

2.2 Methods of obtaining materials cost

2.3 Estimating time requirement to perform services

LO3. Calculate costs

3.1 Costing techniques and procedures

3.2 Calculating total direct cost

3.3 Calculating total indirect cost

3.4 Calculating total job cost

LO 4. Document details

4.1. Documenting costs and charges

4.2. Verifying Costs and calculations

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	❖ 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

		❖ Summarize main points		
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	❖ Introduce the trainees with their peers

			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	❖ Use sign language interpreter ❖ Brief on the instruction of the	❖ Provide activity based assessment ❖ Brief on the instruction of the exam	❖ Provide activity based assessment

	❖ Time extension	exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Use loud voice ❖ Time extension	❖ Conduct close follow up ❖ Time extension

ASSESSMENT CRITERIA:

LO1. Gather information

- Details of the job requirements are obtained from information supplied
- Details of services to be provided are compiled
- Delivery point and methods of transportation are identified where necessary
- Details are recorded in accordance with enterprise practice

LO2. Estimate materials and duration

- Types and quantities of supplies and materials required for the servicing jobs are identified
- Identified supplies and materials cost are obtained from suppliers and estimated
- Labor requirements to achieve and/or perform required services are estimated
- Time requirements to perform required services are estimated

LO3. Calculate costs

- Total materials, labor and overhead cost allowances are calculated in accordance with enterprise procedures
- Total job cost is calculated, including overheads and mark-up percentages
- Final cost is calculated and presented to client/customer following the organization standard procedures

LO4. Document details

- Details of costs and charges are documented in accordance with enterprise practice and standards
- Costs, calculations or other details are verified in accordance with enterprise procedures
- Details are documented for future reference in accordance with enterprise procedures and standard

Annex: Resource Requirements

EIS AUM4 M05 0322		Preparing Job Estimation and Cost		
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	***Learning Materials***			
1.	TTLM	Prepared by ministry of labor and skills	5 Pcs	1:5
2	Reference and Text books			
2.1	Light and Heavy Vehicle Technology	Nunney, M. J., 4th ed., Rutledge, 2007	5 Pcs	1:5
2.2	Automotive Technology: Principles, Diagnosis & Repair, and Service	Halderman, D., 3rd ed., Prentice Hall, 2008.	5 Pcs	1:5
2.3	Automotive Technology: A systems approach	Erjavec, J., 7th ed., Delmar Cengage Learning, 2017	5 Pcs	1:5
2.4	Automotive Mechanics	Crouse, W.H. and Anglin D.L., 10th ed., McGraw-Hill Companies, 1993.	5 Pcs	1:5
2.5	Automotive Repair and Maintenance	Abrahams, A., Pearson South Africa, 2008.	5 Pcs	1:5
2.5	Service Manuals	(TOYOTA, Nissan)	5 Pcs	1:5
4.	Journals/Publication/Magazines			
B.	***Learning Facilities & Infrastructure***			
1.	Class room	For lecture in (m^2)	1 Pcs	6:5
2.	Technical Drawing Room	For drawing (m^2)	1 Pcs	6:5
3.	Work shop	For practical activity (m^2)	1 Pcs	4:1

4.	Work bench	Length x Width x Height (2m x 1.2m x0.78m)	5 Pcs	1:5
5.	White and/or black board	Length x Height (2.4m x 1.2m)	1 Pcs	1:25
6.	Arm chair	Length x Width x Height (1m x 0.55m x0.74m)	25 Pcs	1:1
7.	Chair (for trainer)	Length x Width x Height (0.4m x 0.56m x0.78m)	1 Pcs	1:25
8.	Table	Length x Width x Height (1.2m x 0.8m x0.74m)	1 Pcs	1:25
9.	Computer	(Desktop/Laptop)	1 Pcs	1:25
10.	LCD Projector		1 Pcs	1:25
C.	***Consumable Materials***			
D.	**Tools and Equipment**			

Acknowledgement

The Ministry of Labor and Skills wishes to thank and appreciate trainers who donated their effort and time to develop this outcome-based curriculum for the TVET program Automotive Mechanics Level IV. We also thank all regional TVET Bureaus and Colleges, Federal TVET Institute, Ethiopian Defense Engineering College, Ethiopian Management Institute and program facilitators for their active facilitation of their trainers for the development of this curriculum.

The trainers who developed the curriculum

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