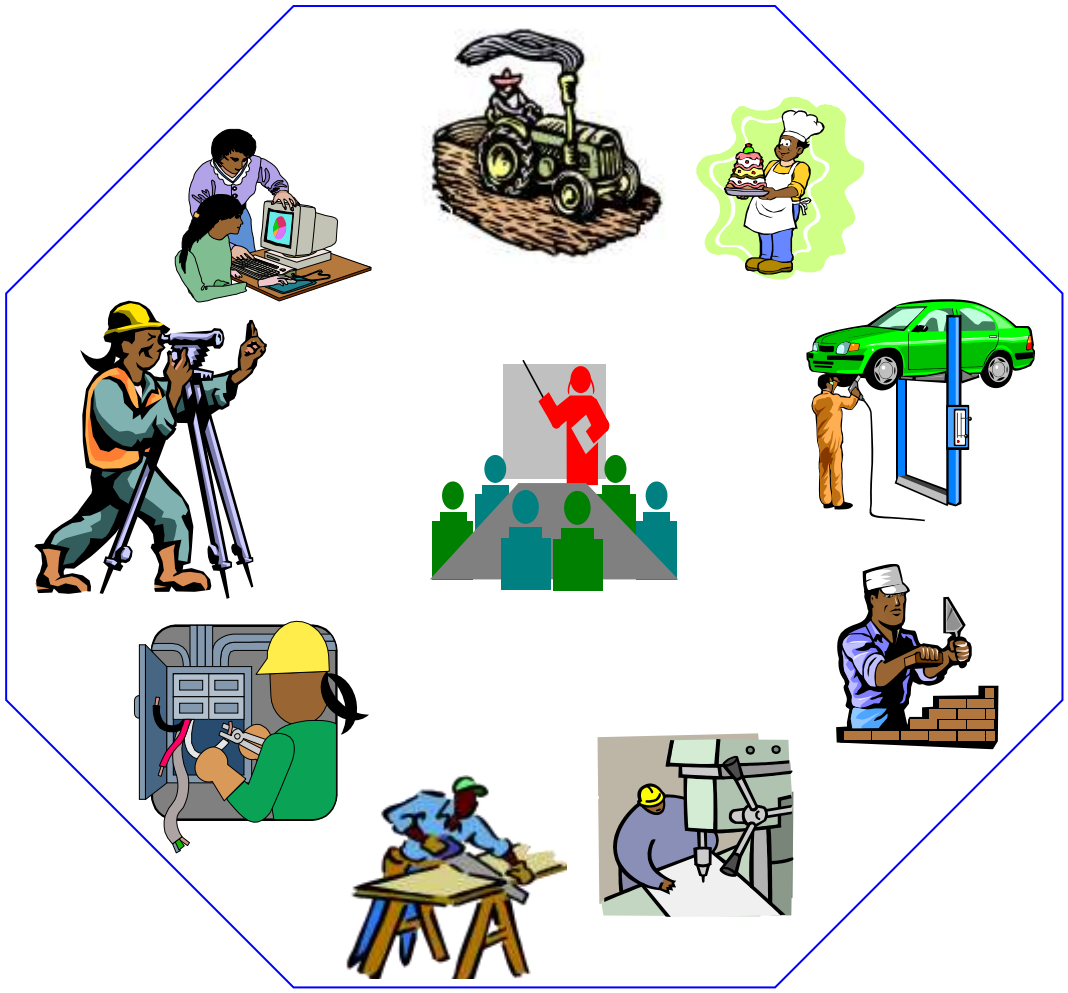
Federal Democratic Republic of Ethiopia
OCCUPATIONAL STANDARD

AGRICULTURAL MACHINERY AND EQUIPMENT MECHANICS

NTQF Level I, II, III and IV



Ministry of Labor and Skill
March 2022

Introduction

Introduction

Ethiopia has embarked on a process of reforming its TVET-System. Within the policies and strategies of the Ethiopian Government, technology transformation – by using international standards and international best practices as the basis, and, adopting, adapting and verifying them in the Ethiopian context – is a pivotal element. TVET is given an important role with regard to technology transfer. The new paradigm in the outcome-based TVET system is the orientation at the current and anticipated future demand of the economy and the labor market.

The Ethiopia Occupational Standards (EOS) is the core element of the Ethiopian National TVET-Strategy and an important factor within the context of the National TVET-Qualification Framework (NTQF). They are national Ethiopian standards, which define the occupational requirements and expected outcome related to a specific occupation without taking TVET delivery into account.

This document details the mandatory format, sequencing, wording and layout for the Ethiopia Occupational Standard which comprised of Units of Competence.

A Unit Title describes a distinct work activity. It is documented in a standard format that comprises:

- Occupational title and NTQF level
- Unit title
- Unit code
- Unit descriptor
- Elements and Performance Criteria
- Variables and Range
- Evidence guide

Together all the parts of a Unit Title guide the assessor in determining whether the candidate is competent.

The ensuing sections of this EOS document comprise a description of the occupation with all the key components of a Unit Title

- Chart with an overview of all Units of Competence for the respective level including the Unit Codes and the Unit Titles
- Contents of each Unit Title(competence standard)
- Occupational map providing the technical and vocational education and training (TVET) providers with information and important requirements to consider when designing training programs for this standard and for the individual, a career path.

Modification History

2.1 Occupational Title:

This occupational Standard is set for **Agricultural Machinery and Equipment Mechanics** Level I, II, III and IV. This occupational Standard is version2 and revised in March 2022.

2.2. Description of the Occupation

2.2.1 Level Description

Level I

In the previous version (version 1); level I didn't specified for a single occupation and had been entitled as 'Farm Mechanization 'which was customized as '**Agricultural Machinery and Equipment Mechanics** ' for the current revised version. Based on the NTQF and the guide lines of the new TVET policy formulated; the exiting occupation is reviewed by accepting, removing, shifting and modifying the name as well as its body. Moreover, the revisitation process again takes into consideration the benchmark from Australia and Philippine to be full and address its intended objective.

Level II

Breadth, depth and complexity of competences would cover selecting, adapting and transferring skills and knowledge to new environments and providing technical advice and some leadership in resolution of specified problems. This would be applied across a range of roles in a variety of contexts with some complexity in the extent and choice of options available.

Performance of a defined range of skilled operations, usually within a range of broader related activities involving known routines, methods and procedures, where some discretion and judgment is required in the selection of equipment, services or contingency measures and within known time constraints.

Applications may involve some responsibility for others. Participation in teams including group or team co-ordination may be involved.

Level III

Breadth, depth and complexity of knowledge and competencies would cover a broad range of varied activities or application in a wider variety of contexts most of which are complex and non-routine. Leadership and guidance are involved when organizing activities of self and others as well as contributing to technical solutions of a non-routine or contingency nature.

Performance of a broad range of skilled applications including the requirement to evaluate and analyse current practices, develop new criteria and procedures for performing current practices and provision of some leadership and guidance to others in the application and planning of the skills. Applications involve responsibility for, and limited organization of, others.

2.2.2 Occupant Performance Profile

Agricultural Machinery and Equipment Mechanics level I

Occupational standard for this level covers description of the competences (knowledge, skills and attitudes) to perform work activities to standard required at work places expressed as occupant performance profile listed on the chart

Occupant Performance Profile

Agricultural Machinery and Equipment Mechanics level II

Occupational standard for this level covers description of the competences (knowledge, skills and attitudes) to perform work activities to standard required at work places expressed as occupant performance profile listed on the chart

Occupant Performance Profile

Agricultural Machinery and Equipment Mechanics Level III

Occupational standard for this level covers description of the competences (knowledge, skills and attitudes) to perform work activities to standard required at work places expressed as occupant performance profile listed on the chart:

Occupant Performance Profile

Level IV

Agricultural Machinery and Equipment Mechanics level IV

Occupational standard for this level covers description of the competences (knowledge, skills and attitudes) to perform work activities to standard required at work places expressed as occupant performance profile listed on the chart:

2.2.3. *Unit Code:*

There are agreed conventions for the unit codes used for unit of competences organized for any specific occupational standard. Codes are given by considering international and national benchmarks.

Example:

Unit Title: Develop animal feed plan and conduct ration formulation

Unit Code: **AGR MEM4 01 1222**

Unit Coding is described here under:

Character	**What it stands for:**
AGR	First three characters signify the priority/major industry/sector acronym. **AGR** represents Agriculture
MEM4	Four characters in the second group signify the acronym of the occupational title expressed as a work function and qualification level written in numerical

	form shows the unit belongs. **MEM4** represents Agricultural Machinery and Equipment Maintenance and number **4** represents that the occupational standard serves for Level IV
01	Third group with two numbers signify the numerical order of the specific unit in the level occupational standard
1222	Fourth group of four characters signify the month and year of OS development. E.g. March **2022**

2.2.3 Version Change

This occupational standard is developed in the title of **"Agricultural Machinery and Equipment Mechanics "**for level I, II, III and IV. The title of the occupational standard for this version is maintained the existing title names: Farm Machinery and Equipment Maintenance L-I, Agricultural Machinery and Equipment Maintenance L-II, Agricultural Machinery and Equipment Maintenance L-III and Agricultural Machinery and Equipment Maintenance L-IV to which the relevant sector for the occupation- Agriculture sector belongs.

The version number for future revision will either be changed or not, depending on the extent of the change. Thus, those who are responsible to undertake competence assessment and provide training should check for the version number and review date of the document to confirm the latest version number before developing assessment tools and commence training respectively. Users are also advised to contact the agency for any doubts they have on the document or may refer to the website.

The development date is the time the document is prepared and validated by relevant industry experts and approved by relevant sector leading the industry. It indicates the effective date to use the document for training and assessment purposes and termination of use of the previous version for any purposes.

The endorsed occupational standards and their components may remain current up to five years from the date of development. This version is developed in **March 2022**

Previous Occupational Standard	**Modified Occupational standard**
Name and Level: Farm Machinery and Equipment Maintenance : Level I	Name and Level: **Agricultural Machinery and Equipment Mechanics**: Level I
Name and Level: Farm Machinery and Equipment Maintenance : Level II	Name and Level: **Agricultural Machinery and Equipment Mechanics**: Level II
Name and Level: Farm Machinery and Equipment Maintenance Level III	Name and Level: **Agricultural Machinery and Equipment Mechanics**: Level III

Name and Level: Farm Machinery and Equipment Maintenance : Level IV	Name and Level **Agricultural Machinery and Equipment Mechanics**: Level IV
Version: one	Version: two
Date of Development: July 2014	Date of Development: March 2022

UNIT OF COMPETENCE CHART

Occupational Standard: Agricultural Machinery and Equipment Mechanics

Occupational Code: AGR MEM

NTQF Level I

AGR MEM1 01 0322 Use and Maintain workshop Tools and equipment	**AGR MEM1 02 0322** Perform Bench Work	**AGR MEM1 03 0322** Test, Service and Maintain Storage Battery Systems
AGR MEM1 04 0322 Remove and Replace Electrical/Electronic Units/Assemblies	**AGR MEM1 05 0322** Remove and Tag Power Train System Components	**AGR MEM1 06 0322** Remove and Tag Engine System Components
AGR MEM1 07 0322 Remove and Tag Steering, Suspension and Brake System Components	**AGR MEM1 08 0322** Sketch and Interpret Working Drawings	**AGR MEM1 11 0322** Service and Repair Tyres and Tubes
AGR MEM 1 10 0322 Apply Agricultural Extension Communication	**AGR MEM 1 11 0322** Apply Basics of Human Nutrition Practices	**AGR MEM 1 12 0322** Implement Agribusiness Marketing
AGR MEM 1 13 0322 Apply 5S Procedures		

NTQF Level II

AGR MEM2 01 0322 Perform Arc and Oxy Acetylene Welding	**AGR MEM2 02 0322** Repair and overhaul Starting and Charging Systems/Components	**AGR MEM2 03 0322** Service and Repair Engine Systems
AGR MEM2 04 0322 Inspect and Service Steering System	**AGR MEM2 05 0322** Inspect and Service Suspension System	**AGR MEM2 06 0322** Inspect, Service and Repair Braking Systems
AGR MEM2 07 0322 Test and Repair Electrical/Electronic Units/Assemblies and Low Voltage accessories	**AGR MEM2 08 0322** Service and Repair Agricultural Implements & Trailers	**AGR MEM2 09 0322** Perform Periodic Service
AGR MEM2 10 0322 Carry out Wheel Alignment and Balance	**AGR MEM2 11 0322** Repair and Service Livestock Machinery and equipment	**AGR MEM2 12 0322** Perform body repair and paints
AGR MEM2 13 0322 Apply Agricultural Extension service for rural development	**AGR MEM2 14 0322** Prevent and Eliminate MUDA	

NTQF Level III

AGR MEM3 01 0322 Perform Engine Tune up	**AGR MEM3 02 0322** Service Electronic fuel Injection systems and components	**AGR MEM3 03 0322** Repair Air Conditioning System
AGR MEM3 04 0322 Repair and test Pneumatic Systems/Components	**AGR MEM3 05 0322** Repair and test Hydraulic Systems	**AGR MEM3 06 0322** Repair Harvesting Machineries
AGR MEM3 07 0322 Service and Repair Irrigation Pumps	**AGR MEM3 08 0322** Maintain Post-Harvest Machinery and Equipment	**AGR MEM3 09 0322** Service and Repair Chemical Spraying Machinery and Equipment
AGR MEM3 10 0322 Overhaul Diesel Injection Pump	**AGR MEM3 11 0322** Apply Digital Technology in Agriculture	

NTQF Level IV

AGR MEM4 01 0322 Overhaul Engines and Associated Engine Components	**AGR MEM4 02 0322** Service and Repair Power train	**AGR MEM4 03 0322** Repair Automatic Transmissions System
AGR MEM4 04 0714 Service and Repair Electronically Controlled Management Systems	**AGR MEM4 05 0322** Manage workshop operational activities	**AGR MEM4 06 0322** Analyse and Evaluate Farm machineries and equipment Performance
AGR MEM4 07 0322 Estimate Agricultural Machinery Repair and Maintenance Cost	**AGR MEM4 08 0322** Develop value chain analysis	

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level I	
Unit Title	**Use and Maintain workshop Tools and equipment**
Unit Code	**AGR MEM1 01 0322**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to Maintain tools and Equipment for use tools and Equipment to carry out measurements and identify workshop tools and Prepare work station

Elements	Performance Criteria
1. Identify workshop tools and Prepare work station	1.1 ***Personal protective equipment*** needs are identified 1.2 ***Hand tools, power tools*** and ***measuring devices*** are identified 1.3 Workstation is made ready for work activities. 1.4 Procedures and information such as workshop manuals and specifications are acquired. 1.5 Methods in identifying tools and equipment are implemented in accordance with workplace procedures and manufacturer specifications. 1.6 Identified/selected ***testing devices, tools*** and ***equipment*** are checked for functionality and made ready for use. 1.7 Unsafe or faulty tools and equipment including measuring tools are identified and marked for repair according to standard company procedure. 1.8 OHS measures and warnings in relation to working with tools and equipment are observed throughout the work operation.
2. Carry out measurements	2.1 ***Measuring tools/devices*** are selected in line with job requirements. 2.2 Measuring/testing devices are checked and adjusted as needed in accordance with work requirements. 2.3 Appropriate method of conducting measurements is implemented in accordance with workplace procedures and manufacturer specifications. 2.4 Measuring instruments are handled without damage and according to procedures. 2.5 Measurement results are compared with manufacturer specifications to indicate compliance or non-compliance. 2.6 Results are documented with evidence and supporting information and recommendation(s).
3. Use tools and Equipment	3.1 Tools and measuring equipment are used according to tasks undertaken. 3.2 All safety procedures in using tools and Equipment are observed at all times and appropriate ***Personal Protective Equipment (PPE)*** is used.

	3.3 Tools and equipment are handled without damage and according to procedures. 3.4 Malfunctions, unplanned or unusual events are reported to the supervisor.
4. Maintain tools and Equipment	4.1 ***Routine maintenance*** of tools is undertaken according to standard operational procedures, principles and techniques. 4.2 Equipment and tools are cleaned before and after use in accordance with manufacturer's instructions. 4.3 Tools and equipment are stored safely in appropriate locations in accordance with manufacturer's specifications or standard operating procedures.

Variable	**Range**
Personal Protective Equipment (PPE)	May include but not limited to: • Gloves • Protective eyewear • Apron/overall • Safety shoes • Goggle • Ear Muff • Sound level metrics
Testing devices, tools and Equipment	May includes but not limited to: • Hand tools for adjusting, dismantling, assembling, finishing, cutting • Tool set includes the following but not limited to: screw drivers, pliers, punches, wrenches, files • Generic Mechanic Tools set • Power tools • Measuring and testing Tools • Special tools • Equipment
Hand tools, power tools	May include but not limited to: • Spanners • Hammers • Punches • Screwdrivers • Sockets • Wrenches • Scrapers • Chisels • File • Tap and die • Electric or pneumatic/hydraulic tools • Grinders,

	• Sanders, planers, routers and drills Hacksaws
Measuring tools/devices	May include but not limited to: • Micrometer • Vernier Caliper • Multi meter • Tachometer • Timing light • Dial gauge • Tune scopes • Test lamp
Routine maintenance	May include but not limited to: • Cleaning • Lubricating • Tightening • Simple tool repairs • Hand sharpening • Adjustment using correct procedures

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills competence to: • Apply safe working practices at all times • Identify appropriate measuring devices, tools and equipment • Use measuring devices, tools and equipment according to tasks • maintain and store tools in appropriate location

Required knowledge	Demonstrate knowledge and attitude of: • Reading skills required to interpret work instruction and numerical skills • Prepare work station for use • Communication skills • Types of hand tools, power tools and measuring devices • Working principles of tools • Safe working procedures • Working procedures of tools and equipment's • Problem solving in emergency situation
Required skills	Demonstrate skill to • Safety requirements in handling tools • Use hand tools, power tools and measuring devices • Identify hand tools, power, and measuring devices • Maintenance of hand tools, power tools and measuring devices and Equipment • Prepare work station for use • Carryout test and measurement • Storage of Tools and Equipment • Communicate information about processes, events or tasks being undertake to ensure a safe and efficient working environment
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level I	
Unit Title	**Perform Bench Work**
Unit Code	**AGR AMM1 02 0322**
Unit Descriptor	This unit covers the competences required to determine job requirements, perform basic bench work operations (i.e. layout; measuring, cutting; chiselling, grinding, filing; drilling; tapping etc…) and check the components for conformance to specifications.

Elements	Performance Criteria
1. Read, Lay-out and mark dimensions/ features on work piece	1.1 ***OHS requirements and personal protection equipment*** are applied and observed. 1.2 Working drawing and dimensions are accessed and read 1.3 ***Materials*** are selected according to the requirements specified in the working drawing. 1.4 Dimensions/features are laid out and marked in accordance with drawing specifications using ***bench work tools and equipment***. 1.5 Lay-outing and marking are performed and applied.
2. Perform Cutting, chipping and filling	2.1 The required bench work tools are identified 2.2 Work pieces (blocks) are clamped in ***work holding devices*** to avoid damage and accidents. 2.3 Appropriate marking and measuring tools and devices are used 2.4 Work pieces are cut, ***chipped*** or ***filed*** to within tolerance specified in the drawing. 2.5 Broken or dull cutters (hacksaw blades, files) are replaced according to requirements 2.6 ***Bench work operations*** are performed safely 2.7 Final works are demonstrated, inspected and tested to specified working drawing tolerance
3. Conduct Drilling, grinding, ream and lapping holes	3.1 Hole is drilled, reamed, spot-faced and lapped to drawing specification. 3.2 Drilling, reaming or lapping holes are performed according to recommended sequence. 3.3 Grinding operations are performed according working requirement 3.4 Lapping/flushing agent is selected and applied according to the requirements of operation. 3.5 Reaming holes are carried out 3.6 Operations are performed applying safety procedures
4. Perform Cutting threads using tap and die	4.1 ***Thread*** is cut to fit gage or mating screw, within tolerance given in drawing. 4.2 Thread is cut in accordance with the recommended tapping

	sequence. 4.3 Thread cutting operations are performed applying safely. 4.4 Final works are demonstrated, inspected and checked to specified working drawing tolerance
5. Carryout sheet metal cutting and bending	5.1 ***Scrapers*** are selected according to requirements of operation for sheet metal marking 5.2 Cutting operation are applied based on drawing 5.3 Cutter is sharpened to conform to specifications. 5.4 Bending is performed with appropriate measurement and equipment. 5.5 Cutting and bending is performed by applying safety procedures.
6. Conduct Scraping and honing holes	6.1 Work pieces are scraped and honed according to drawing specifications 6.2 Honing flushing agent is selected and applied according requirements of operation. 6.3 Honing and ridging holes are carried out 6.4 Cut edges are honed and free of burrs. 6.5 Cutters are ground using appropriate cooling agents. 6.6 Cutting tool grinding is performed applying safety procedures and using personal protective devices.

Variables	**Range**
Materials	May include but not limited to: • Ferrous • Non Ferrous • Sheet metals • Flux and lapping compound
Bench work tools and equipment	May include but not limited: • Drill and grinding machine • vice • Pedestal Grinder • Surface plate and anvil • Bending machine • Work bench • Layout and marking tools • Cutting tools (hacksaw, chisel, files) • Drill, reamers, laps • Thread cutting tools • measuring tools • scrapers • Chisels
Work holding devices	May include but not limited to: • Clamps • Vices

Chipping	May include but not limited to: • Grooves • Slots • keyways
Filing	May include but not limited to: • Filling operations • Contoured outline • Contoured holes • File types based on ✓ teeth cut (single cut, double cut, rasp and curved tooth) ✓ cut (bastard, second cut) ✓ cross section (square, round, triangular, half-round) ✓ shape (flat, hand, pillar, mill)
Bench work operations	May include but not limited to: • Layout and marking • Cutting • Chipping and Filing • Drilling • Boring and counter boring • Lapping • Scraping • Honing • Spot-facing • Reaming • Thread cutting and off-hand grinding
Thread	May include but not limited to: • Internal threads • External threads
Scraper	May include but not limited to: • Flat surface (flat scraper, hook scraper) • Curve surface (half-round bent scraper, three-cornered scraper)

Evidence Guide	
Critical Aspects of Competence	Must demonstrate skills and knowledge competence in: • Lay-out and mark dimensions/features on the work-piece • Cut, chip and file work-piece • Drill, ream and lap holes • Cut threads • Perform portable grinding • Perform scraping and honing/boring boles
Required Knowledge and Attitudes	Demonstrates knowledge of: • Shop Safety Practices and Identification of hazardous areas • Safe working habits • Use of protective clothing and devices • Safe handling of tools, equipment and materials • Housekeeping practices • Scales, Percentages and ratios • Conversion of units (English to metric) • Computation of cutting speed, machine adjustments and machine rpm • Working Drawing • Measurements • Geometrical tolerances • Materials and related science (Classification and mechanical properties) of engineering materials • Use and care of bench work tools and equipment • System and Operations • Laying-out and marking • Sawing, cutting, chipping, filing, lapping • Drilling, reaming, tapping • Cutting threads • Scraping and honing • External threading • Extracting fasteners • grinding
Required Skills	Demonstrates skills in: • Performing bench work operations • Using bench work tools and equipment • Using measuring instruments • Operating drilling and grinding machines • Perform layout, filing, cutting, drilling, tapping, scrapping, lapping • Performing safety measures and procedures
Resource Implications	The following resources must be provided: • Materials, tools, equipment and facilities appropriate to proposed activity • drawings, sketches or blueprint
Methods of Assessment	Competence may be assessed with: • Interview / Written Test

	• Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the workplace or in simulated workplace environment.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level I	
Unit Title	**Test, Service and Maintain Storage Battery Systems**
Unit Code	**AGR MEM1 03 0322**
Unit Descriptor	This unit covers the competence to inspect service and maintain storage battery systems on agricultural machineries and equipment. Work requires individuals to demonstrate judgement and problem-solving skills in managing own work activities and contributing to a productive team environment.

Elements	**Performance Criteria**
1. Prepare to undertake battery inspection	1.1. ***OHS and environmental requirements*** are identified and confirmed. 1.2. ***Personal protection equipment*** needs are used throughout the work. 1.3. ***Safe operating procedures*** and ***information*** are sourced. 1.4. Technical requirements for inspection are sourced. 1.5. ***Tools*** and ***equipment's*** are identified and prepared.
2. Conduct inspection	2.1. Methods for the conduct of inspection are implemented in accordance with workplace procedures and manufacturer/component supplier specifications. 2.2. Inspection results are compared with manufacturer/ component supplier specifications. 2.3 Battery test results are compared. 2.4. Results are documented with evidence and supporting information and recommendations made. 2.5. Report is made in accordance with workplace procedures.
3. Carry out service and maintenance	3.1 Technical and tool requirements for servicing and maintenance are identified and support. 3.2 Methods for the conduct of service and/or maintenance are implemented.

	3.3 Battery pole or terminal Cleaning and refilling is performed. 3.4 Battery electrolyte replaced and top up is performed. 3.5 Battery charging and boosting operation are performed. 3.6 Battery clamp adjustments made during service and/or maintenance. 3.7 Report is made in accordance with workplace procedures.
4. Clean up work area and maintain Equipment	4.1 ***Materials*** that can be reused are collected and stored. 4.2 Waste and scrap are removed following workplace procedures. 4.3 Equipment and work area are cleaned and inspected for serviceable condition in accordance with workplace procedures. 4.4 Unserviceable equipment is tagged and faults identified in accordance with workplace requirements.

Variable	**Range**
Environmental requirements	May include but not limited to: • Waste management, noise, dust and clean-up management • Regulations, including International standards, internal company quality policy and standards and enterprise operations and procedures
OHS	May include but not limited to: • Protective clothing and Equipment, use of tooling and Equipment, workplace environment and safety, handling of material, use of fire fighting Equipment, enterprise first aid, hazard control and hazardous materials and substances
Personal protective equipment	May include but not limited to: • Personal protective Equipment is to include that prescribed under legislation/regulations/codes of practice and workplace policies and practices
Safe operating procedures	May include but not limited to: • The conduct of operational risk assessment and treatments associated with vehicular movement, toxic substances, electrical safety, equipment movement and operation, manual and mechanical lifting and shifting and working in proximity to others and site visitors • Emergency shutdown and stopping of Equipment, extinguishing fires, enterprise first aid requirements and site evacuation
Information	May include but not limited to: • Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, Material Safety Data Sheets (MSDS), diagrams and sketches • Safe work procedures related to inspection, servicing and maintenance of battery storage systems • Regulatory/legislative requirements pertaining to automotive industry, including International Design Rules • Engineer's design specifications and instructions

	• Organisation work specifications and requirements • Instructions issued by authorised enterprise or external persons • International standards • Verbal and graphical instructions and fault reporting and may include site specific instructions, written instructions, plans or instructions related to job/task, telephones and pagers
Materials	Materials may include but not limited to: • Cleaning agents • Electrolyte • Distilled water • Carbon rod/lead • Containers
Tool and Equipment	May include but not limited to: • Hand tools • Peak load tester • Multimeter • Hydrometer

Evidence guide	
Critical aspects of competence	Must demonstrate knowledge, attitude and skills to: • Applying safety procedures and requirements • Completing preparatory activity in a systematic manner • Servicing and maintaining battery storage systems in accordance with manufacturer/component supplier and site requirements • Applying battery boosting and battery charging • Completing inspection in accordance with manufacturer/component supplier requirements • Completing work within workplace timeframes • Completing workplace documents
Required knowledge and attitude	Demonstrates knowledge of: • OHS and environmental regulations/requirements, equipment, material • Personal safety requirements • Working procedure with battery testing equipment • Operating principles and layout of battery storage systems • Type and methods of battery charging, boosting. • Inspection procedures • Service and/or maintenance procedures • Enterprise quality procedure • Work organization and planning processes
Required skills	Demonstrates skills to: • Apply manufacturer/component supplier procedures, workplace policies and procedures • Applying battery boosting and battery charging. • Interacting with other persons both on a one-to-one basis and in groups • Perform inspection, servicing and repairing works

	• Establish safe and effective work processes to resolve problems and downtime • Systematically develop solutions to avoid or minimise reworking and avoid wastage • Use workplace technology related to inspection, servicing and maintenance of battery storage systems • Reporting/documenting of results
Resource implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Methods of assessment	Competence may be assessed through: • Interview / written test • Observation / demonstration with oral questioning
Context of assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level I	
Unit Title	**Remove and Replace Electrical/Electronic Units/Assemblies**
Unit Code	**AGR MEM1 04 0322**
Unit Descriptor	This unit of competence covers the knowledge, attitude and skill required to carry out re-assembly works, tag electrical/ electronic components , remove electrical /electronic system components and prepare to remove and tag electrical/ electronic components

Elements	Performance Criteria
1. Prepare to remove and tag electrical/ electronic components	1.1 ***Electrical/ electronic components*** are identified 1.2 Nature and scope of work and ***environmental requirements*** are identified and confirmed. 1.3 ***OHS, regulatory*** requirements and ***personal protection equipment*** are prepared and applied. 1.4 Workshop manuals and specifications, and tooling are sourced. 1.5 Hazard and ***Emergency procedures*** are identified and followed as per organization's guideline.
2. Remove electrical /electronic system components	2.1. Electrical/electronic components removal according to ***Safe removal procedures*** followed 2.2. Components are removed and tagged are implemented 2.3. Components are removed without damage. 2.4. Inspection of components is carried out. 2.5. Report is processed in accordance with enterprise procedures.
3. Tag electrical/ electronic components	3.1 Tagging procedures are performed. 3.2 Require ***tagging materials*** are identified 3.3 Components are tagged without damage 3.4 Report result and documentation is implemented.
4. Carry out re-assembly works	4.1. Cleaning and arranging the components for assembling is applied 4.2. Electrical/ electronic components assembling works in reverse order performed 4.3. Reporting and documentation is implemented

Variable	Range
Environmental requirements	May include but not limited to: • Waste management and clean-up management • Regulations, including international standard internal quality policy and standards and enterprise operations and procedures
OHS requirements	May include but not limited to: • Use of tooling and Equipment, • Workplace environment and safety, • Handling of material, • Use of fire fighting equipment,

	• Enterprise first aid, • Hazard control and • Hazardous materials and substances
Personal protective equipment	May include but not limited to: • Include that prescribed under legislation/regulations/codes of practice and workplace policies and practices • Protective clothing and Equipment
Safe removal procedures	May include but not limited to: • Electrical safety • Equipment movement and operation • Manual and mechanical lifting and • Shifting, and working in proximity to others and site visitors • Emergency shutdown and stopping of equipment, • Extinguishing fires, • Enterprise first aid requirements and • Site evacuation
Emergency procedures	May include but not limited to: • Emergency shutdown • Stopping of equipment, • Extinguishing fires, • Enterprise first aid requirements • Site evacuation
Electrical/ electronic components	May include but not limited to: • Fuse • Wire • Starter motor • Socket • Battery • Alternator • Light system
tagging materials	May include but not limited to: • Glue • Stickers • Different color papers • parkers

Evidence guide	
Critical aspects of competence	Must demonstrate skills and knowledge competence in: • Applying safety procedures and requirements • Selecting appropriate techniques • Completing preparatory activity • Identifying, removing and tagging electrical/ electronic components • Conducting removal and tagging without damage
Required knowledge and attitude	Must demonstrate knowledge and attitude to: • OHS regulations/requirements, equipment, material and personal safety requirements

	• Electrical/electronic removing component • Function of each component • Removal procedures • Tagging procedures
Required skills	Must demonstrate skills to: • Apply manufacturer procedures, and workplace policies • Interact effectively with other persons both on a one-to-one basis and in groups, • Identify, removing and tagging electrical/ electronic components • Establish safe and effective work processes resolve problems, downtime and avoid wastage • Apply workplace technology related to removing and tagging electrical components, • Selecting appropriate techniques • Reporting/documenting of results
Resource implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Methods of assessment	Competence may be assessed through: • Interview / written test • Observation / demonstration with oral questioning
Context of assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level I	
Unit Title	**Remove and Tag Power Train System Components**
Unit Code	**AGR MEM1 05 0322**
Unit Descriptor	This unit covers the competence to remove and tag power train assembly. Work involved includes transmissions, drive line, differential and axle of farm machineries component. Work requires individuals to demonstrate minimal judgement and problem-solving skills in managing own work activities and contributing to a productive team environment.

Elements	Performance Criteria
1. Prepare to remove and tag power train system assembly	1.1 **Workplace *information sources* are accessed** 1.2 ***OHS requirements***, including regulatory requirements and personal protection needs are applied throughout the work. 1.3 Information such as workshop, manuals, specifications and tooling required are sourced. 1.4 Power train parts are identified 1.5 Accident's associated with working the removal and tagging of transmission system assembly is applied 1.6 ***Emergency procedures*** are identified and followed as per organization's guideline.
2. Remove power train system assembly	2.1 Methods for the removal of ***components*** are implemented 2.2 ***Power train system*** assembly is removed without damage 2.3 Report is processed in accordance with workplace procedures.
3. Tag power train system assembly	3.1. Resource requirements for tagging are performed. 3.2 Tagging procedures are implemented. 3.3. Assemblies are tagged without damage. 3.4.Work results are reported and documented
4. Carry out re-assembly works	4.1. Cleaning and arranging the components for assembling is applied 4.2. Power train assembling works in reverse order performed 4.3. Reporting and documentation is implemented

Variable	Range
Information sources	May include but not limited to : • Enterprise operating procedures, workshop manuals, supplier data sheets, parts catalogues, customer orders and industry/workplace codes of practice, material safety data sheets and International Design Rules • Safe work procedures related to removing and tagging transmission system assembly • Organisation work specifications and requirements • Verbal and visual instructions and fault reporting and may include

	site specific instructions, written instructions, plans or instructions related to job/task, telephones and pagers
Environmental requirements	May include but not limited to: • Waste management and clean-up management • Regulations, including international Standards, internal company quality policy and standards and enterprise operations and procedures
OHS requirements	May include but not limited to: • OHS requirements are to be in accordance with legislation/regulations/codes of practice and enterprise safety policies and procedures. This may include protective clothing and Equipment, use of tooling and equipment, workplace environment and safety, handling of material, use of fire fighting Equipment, enterprise first aid, hazard control and hazardous materials and substances
Safe operating procedures	May include but not limited to: • Electrical safety, • Equipment movement and operation, • Manual and mechanical lifting and shifting, • Working in proximity to others and site visitors • Personal protective equipment is to include that prescribed under legislation/regulations/codes of practice and workplace policies and practices • Emergency shutdown and stopping of equipment, • Extinguishing fires, • Enterprise first aid requirements and site evacuation
Power train systems	Mayinclude but not limited; • Manual transmission • Driveline components • Differential • Axle/final drive assemblies • Multiple speed and overdrive transmissions
Components	May include but not limited to: • Clutch • Gear box • Propeller shaft • Universal joint • Differential • Axle

Evidence Guide	
Critical Aspects of Competence	Must demonstrate skills and knowledge competence in: • Applying safety procedures and requirements • Selecting methods and techniques appropriate for use • Identifying, removing and tagging power train components • Conducting the removal and tagging without damage
Required Knowledge and Attitude	Demonstrate knowledge of: • OHS regulations/requirements, equipment, material and personal

	safety requirements • Clutch, Transmission, drive line, differential, and axle terminology • Function of each component • Synchronization of components to each other • Removal procedures • Cleaning and inspecting procedures • Tagging procedures • Quality procedures
Required Skills	Demonstrate skills to: • Interpret and apply manufacturer procedures and workplace policies • Establish safe working procedure to resolve problems, downtime and avoid wastage • Removing, tagging and inspecting works are implemented • Use workplace technology related to removing and tagging power train components • reporting/documenting of results
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

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Occupational Standard: Agricultural Machinery and Equipment Maintenance Level I	
Unit Title	**Remove and Tag Engine System Components**
Unit code	**AGR MEM1 06 0322**
Unit descriptor	This unit covers the competence of prepare to remove and tag engine system related components, Remove engine system related components, and assembling works**.** Work requires individuals to demonstrate minimal judgement and problem-solving skills in managing own work activities and contributing to a productive team environment.

Elements	Performance Criteria
1. Prepare to remove and tag engine system components	1.1 ***OHS requirements*** and ***personal protection equipment*** are applied and observed. 1.2 ***Engine system components*** are identified 1.3 Resource requirements for tagging are identified. 1.4 Clean engine system components and workplace for tagging 1.5 Identify Work shop tools and ***environmental requirements***. 1.6 Workplace information sources are accessed 1.7 Work sequence and operating procedures should be organized; such as workshop manuals and specifications are sourced. 1.8 Engine system components for removal are identified 1.9 Emergency procedures are identified and followed as per organization's guideline**.**
2. Remove and Tag engine system components	2.1 Engine system components are removed based on work sequence 2.2 Methods/procedures for the removal and tagging are implemented. 2.3 System components are tagged before and after removal accordingly based on work order 2.4 Components are tagged and removed without damage. 2.5 Report is processed in accordance with workplace procedures.
3. Re assemble engine **s**ystem components	3.1 Assembling procedures are identified 3.2 Assembling procedure in reverse order is applied 3.3. Components are assembled without damage. 3.4 Engine system components are prepared for use. 3.5 Cleaned working areas final report works are performed

Variable	Range

OHS requirements	May include but not limited to : • It is legislation/regulations/codes of practice and enterprise safety policies and procedures. • Protective clothing and equipment, use of tooling and equipment, workplace environment and safety, handling of material, use of firefighting Equipment, enterprise first aid, hazard control and hazardous materials and substances
Engine system components	May include but not limited to: • Intake system, • Exhaust system, • Fuel system, • Cooling system, • Starting system, • Charging system, • Ignition system, and accessories
Environmental requirements	May include but are not limited to: • waste management and clean-up management • regulations, including International Standards, internal company quality policy and standards and enterprise operations and procedures
Information source	May include but not limited to: • Enterprise operating procedures, workshop manuals, supplier data sheets, parts catalogues, customer orders and industry/workplace codes of practice, material safety data sheets and International Design Rules • Safe work procedures related to removing and tagging engine system components • Organisation work specifications, manuals and requirements • verbal and visual instructions and fault reporting and may include site specific instructions, written instructions, plans or instructions related to job/task, telephones and pagers
Emergency procedures	procedures include but may not be limited to: • emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation

Evidence Guide	
Critical Aspects of Competence	Must demonstrate skills and knowledge competence in: • Perform safety procedures and requirements • Selecting appropriate tools for tagging and removal • Identify, remove and tag engine system components withorder • Conduct removal and tagging without damage • Assemble system components without damage

Required Knowledge and Attitudes	Demonstrate knowledge of: • OHS regulations/requirements, equipment, material and personal safety requirements • Engine system operations • Function of each component • Relationship of components to each other • Types of engines and arrangements • Removal procedures • Tagging procedures • Assembling procedures • Quality procedures
Required Skills	Demonstrate skills to: • Apply manufacturer/component supplier specification procedures, workplace policies and rules/regulations • Apply tagging skills required for identification and analysis of technical information • Interact effectively with other persons both on a one-to-one basis and in groups • Establish safe and effective removal work processes with resolve problems and downtime • Demonstrate solutions to avoid or minimise reworking and avoid wastage • Demonstrate the system component replacement and assembly without damage • Apply reporting/documenting of results
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level I	
Unit Title	**Remove and Tag Steering, Suspension and Brake System Components**
Unit Code	**AGR MEM1 07 0322**
Unit Descriptor	This unit covers the competence to remove and tag steering, suspension and brake system components. Work involved includes steering, suspension and brake systems on farm machineries and equipment's. Work requires individuals to demonstrate minimal judgement and problem-solving skills in managing own work activities and contributing to a productive team environment.

Elements	Performance Criteria
1. Prepare to remove and tag steering, suspension and brake system components	1.1 **Workplace *information* sources are accessed and procedures strictly adhered.** 1.2 ***System components*** are identified 1.3 Nature and scope of work and ***environment requirements*** are identified and confirmed. 1.4 ***OHS requirements***, including regulatory requirements and ***personal protection equipment*** needs are observed throughout the work. 1.5 ***Safe operating procedures*** and information such as workshop manuals and specifications, and tooling required, are sourced. 1.6 Method options are analysed and those most appropriate to the circumstances are selected and prepared. 1.7 Dangers associated working with the removal and tagging of steering, suspension and brake system components are observed. 1.8 ***Emergency procedures*** *are identified and followed as per* **organization's guideline.**
2. Remove steering, suspension and brake system components	2.1. Steering, ***suspension*** and brake system components for removal are identified. 2.2. Methods for the removal and tagging are implemented in accordance with manufacturer/component supplier specifications. 2.3. Components are removed without damage. 2.4. Report is processed in accordance with workplace procedures.
3. Tag steering, suspension and brake system components	3.1 Tagging procedures are identified. 3.2 Resource requirements for tagging are identified and support. 3.3 ***Tooling and equipment*** is identified and prepared. 3.4 Components are tagged without damage.
4.ReassembleSteering, Suspension and Brake System Components	4.1 Assembling procedures are identified 4.2 Assembling procedure in reverse order is applied 4.3. Components are assembled without damage.

	4.4 Steering, Suspension and Brake System Components are prepared for use. 4.5 Cleaned working areas final report works are performed

Variable	Range
Information	May include but not limited to: • Enterprise operating procedures, workshop manuals, supplier data sheets, parts catalogues, customer orders and industry/workplace codes of practice, material safety data sheets • Safe work procedures related to removing and tagging of steering, suspension and brake system components • Organisation work specifications and requirements • Verbal and visual instructions and fault reporting and may include site specific instructions, written instructions, plans or instructions related to job/task, telephones and pagers
Environmental requirements	May include but are not limited to: • Waste management and clean-up management • Regulations, including international standard, internal company quality policy and standards and enterprise operations and procedures
Safe operating procedures	May include but not limited to: • Safe operating procedures are to include, but are not limited to the conduct of operational risk assessment and treatments associated with vehicular movement, electrical safety, equipment movement and operation, manual and mechanical lifting and shifting, working in proximity to others and site visitors • Emergency procedures related to this unit are to include, but are not limited to emergency shutdown and stopping of Equipment, extinguishing fires, enterprise first aid requirements and site evacuation
System components	May include but not limited to: • Steering linkages, • Tie rod ends, • Ball joints, • Steering gear box, • "i" beam axle, • Independent suspension, • Springs, , • Drum and disc braking • Tagging is to be by title and application
Emergency procedures	May include but may not be limited to: • Emergency shutdown and stopping of equipment • Extinguishing fires, • Enterprise first aid requirements and • Site evacuation
suspension	May include but may not be limited to: • Trailer suspension system • Haulage suspension system

	• Cabin suspension system
Tooling and Equipment	May include but not limited to • Hand tooling and • Hand-held power tooling • Tags and cleaning materials

Evidence guide	
Critical aspects of competence	Must demonstrate skills and knowledge competence in: • Observing safety procedures and requirements • Selecting methods and techniques • Completing preparatory activity in a systematic manner • Identifying, removing and tagging a range of components by their title and application • Conducting the removal and tagging without damage to components or tooling and equipment
Required knowledge and attitudes	Must demonstrate knowledge of: • OHS regulations/requirements, equipment, material and personal safety requirements • Steering, suspension and brake system terminology • Function of each component • Relationship of components to each other • Removal procedures • Tagging procedures • Quality procedures • Organization and planning processes
Required skills	Must demonstrate skills to: • Apply manufacturer procedures and workplace policies • Apply safe working procedureto resolve problems, downtime, and avoid wastage • Removing and tagging of steering, suspension and brake components • Reporting/documenting of results
Resources implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Methods of assessment	Competence may be assessed through: • Interview / written test • Observation / demonstration with oral questioning
Context of assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level I	
Unit Title	**Sketch and interpret Working Drawings**
Unit Code	**AGR MEM1 08 0322**
Unit Descriptor	This unit covers the competencies required to read and interpret drawings and sketches. It requires interpretations of standard drawings by using symbols, dimensional tolerances and notations

Elements	Performance Criteria
1. Identify basic technical drawing	1.1 ***Drawing instruments identified*** and prepared according to the requirement. 1.2 Drawing is checked and validated against job requirements 1.3 Drawing version is checked and validated 1.4 Identify views, standard symbols and lines 1.5 Instructions are confirmed and followed as required
2. Carry out line, views and standard symbols	2.1 Orthographic and isometric ***drawing*** *a*re carried out 2.2 Orthographic and isometric views are explained 2.3 Sectioned view is implemented. 2.4 Uses of the alphabet of lines are explained 2.5 Projections codes and symbols are correctly identified and explained according to drawing standards
3. Interpret technical drawing	3.1 Component, assembly or object is recognized as required 3.3 Drawing symbols and codes are interpreted appropriately 3.4 Dimensions and material requirements are interpreted. 3.5 Dimensional ***tolerances***, notations are interpreted according to specifications

Variables	Range
Drawing instruments identified	May include but not limited to: • Set square, T-square, compass, divider, protractor etc… • Different types of drawing paper • Pencil • Drawing board • Masking tape
Drawing	May include but not limited to: • Perspective • Section view technique • Exploded view
Tolerance	May include but not limited to: • General tolerance • Angular tolerance • Geometric tolerance

Evidence Guide	
Critical Aspects of Competence	Assessment requires evidence that the candidate: • Identify drawing instruments • Sketch and interpreted technical drawings • interpreted symbols, dimensional and machine components
Required Knowledge and Attitudes	Demonstrates knowledge of: • Alphabet of lines • Drawing symbols • Tolerances • Relationship between the views contained in the drawing • Objects represented in the drawing • Units of measurement used in the preparation of the drawing • Dimensions of the key features of the objects depicted in the drawing • Understanding of the instructions contained in the drawing • The materials from which the object(s) are made • Any symbols used in the drawing as described in range • Hazard and control measures associated with interpreting technical drawings, including housekeeping • safe work practices and procedures
Required Skills	Demonstrates skills of: • Projections • Drawing technique • Dimensioning techniques

	• Checking the drawing against job requirements/related equipment in accordance with standard operating procedures • Confirming the drawing version as being current in accordance with standard operating procedures • Where appropriate, obtaining the current version of the drawing in accordance with standard operating procedures • Reading, interpreting information on the drawing, written job instructions, specifications, standard operating procedures, charts, lists and other applicable reference documents • Checking and clarifying task related information • Undertaking numerical operations, geometry and calculations/formulae within the scope of this unit
Resources Implication	The following resources must be provided: • Workplace or fully equipped assessment location with necessary tools and equipment as well as consumable materials
Methods of Assessment	Competence may be assessed with: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the workplace or in a simulated workplace setting

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level I	
Unit Title	**Service and Repair Tyres and Tubes**
Unit Code	**AGR MEM1 09 0322**
Unit Descriptor	This unit covers the competence required to remove and refit farm machinery tyres and tubes from rims, inspect tyres and tubes to assess serviceability and carry out tyre and tube repairs. The unit includes identification and confirmation of work requirement, preparation for work, removal, repair and fitting of heavy tyres and tubes and completion of work finalisation processes, including clean-up and documentation.

Elements	Performance Criteria
1. Prepare for tyre servicing	1.1 Nature and scope of work requirements are identified and confirmed 1.2 ***OHSrequirements***, including regulatory requirements and ***Personal Protective Equipment*** needs are observed throughout the work. 1.3 Procedures and information such as workshop manuals and specifications is prepared. 1.4 ***Tooling, equipment and materials***required are***sourced***. 1.5 Technical requirements are sourced for repair and fitting of tyres and tubes and support equipment is identified and prepared.
2. Conduct inspection and analyse results	2.1 Inspection works are implemented in accordance with workplace procedures. 2.2 Inspection results are compared with manufacturer/ component supplier specifications. 2.3 Results are documented with evidence and supporting information and recommendation(s) made. 2.4 Report is done in accordance with workplace procedures.
3. Carry out removal**,** repair and refit	3.1 ***Safe operating procedures*** are observed and noted during the use of tools/ equipment. 3.2 Types & methods of service and repair are implemented. 3.3 Removal, repair and refit operation are implemented. 3.4 Inspection of road wheel assemblies, mounting points and fittings for damage and wear 3.5 Findings and recommendations are completed in accordance with enterprise procedures. 3.6 ***Emergency procedures*** are identified and followed as per organization's guideline.

4. Prepare equipment for use or storage	4.1 Repair schedule documentation is completed. 4.2 Final inspection is made to ensure safety features are in place. 4.3 Final inspection is made to ensure work is to workplace expectations. 4.4 Equipment is cleaned for use or storage to workplace expectations. 4.5 Job card is processed in accordance with workplace procedures.

Variable	**Range**
OHS requirements	May include but are not limited to: • Protective clothing and equipment, • Use of tooling and equipment, • Workplace environment and safety, • Handling of material, • Enterprise first aid, • Hazard control and hazardous materials and substances
Personal Protective Equipment	May include but are not limited to: Is to include: that prescribed under legislation/regulations/codes of practice and workplace policies and practices
Tooling, equipment and materials	May include but are not limited to: • Hand tools • Breaker devices, , • Jacks • Wheel block • Safety stand • Tyre remover • Tyre changer machine • Vulcaniser • Hoists and • Pressure gauge • Tyre balancer • Air compressor • Pry bar/lever • Tip top
Sources of information	May include but are not limited to: • Verbal or written and graphical instructions, • Safe work procedures related to the removal, repair and fitting of heavy tyres and tubes • Regulatory/legislative requirements pertaining to the automotive industry, including Ethiopian design rules • Engineer's design specifications and instructions • Organisation work specifications and requirements

	• Instructions issued by authorised enterprise or external persons • Ethiopian Standards
Safe operating procedures	May include but are not limited to: • The conduct of operating risk assessment and treatments associated with: ➢ Vehicular movements, ➢ Control air pressure ➢ Toxic substances, ➢ Electrical safety, ➢ Equipment movement and operation, ➢ Manual and mechanical lifting and shifting, ➢ Working in proximity to others and site visitors
Emergency procedures	May include but are not limited to: • Emergency shutdown and stopping of equipment, • Extinguishing fires, • Enterprise first aid requirements and site evacuation
Environmental requirements	May include but are not limited to: • Waste management, • Noise, dust and clean-up management

Evidence Guide	
Critical Aspects of Competence	Must demonstrate skills and knowledge competence in: • Applying safety procedures and requirements • Communicating effectively with others involved in or affected by the work • Selecting methods and techniques appropriate for use • Accurately interpreting inspection results • Conducting the removal, repair and refit of tyres and tubes in accordance with workplace procedures • Completing removal, repair and refit of wheels, tyres and tubes and associated components within workplace timeframes • Present equipment to customer in compliance with workplace requirements
Required knowledge and attitudes	Demonstrate knowledge of: • OHS and environmental regulations/requirements, equipment, material and personal safety requirements • Operating principles of tyre and tube repair equipment and their relationship to each other • Accident prevention during working on tyre and tube repair equipment • Types and layout of service/repair manuals • Inspection procedures • Repair procedures • quality procedures

Required Skills	Demonstrate skills to: • Interpret and apply manufacturer procedures, workplace policies and procedures • Apply oral communication skills sufficient to convey information and concepts to customers • Apply planning and organising skills to own work activities, including making good use of time and resources, • Establish safe and effective work processes to resolve problems and downtime, • Systematically develop solutions to avoid or minimise reworking and avoid wastage • Apply workplace technology for removal, repair and fitting of heavy tyres and tubes, including the use of measuring equipment, specialist tooling • Reporting/documenting of results
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting

Occupational Standard : **Agricultural Machinery and Equipment Maintenance Level I**	
Unit Title	**Apply Agricultural Extension Communication**
Unit Code	**AGR MEM1 10 0322**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to understand the Concept and evolution of agricultural Extension, apply extension methods and Approaches, apply Agricultural extension Communication and facilitation for technology promotion, Conduct training and record and document data
Element	**Performance Criteria**
1. Understand the Concept and evolution of Agricultural Extension	1.1 The ***conceptof Agriculturalextension*** is understood to gain relevant knowledge 1.2 The ***evolution and progress of agricultural extension*** is expressed to understand the concept of Agricultural Extension 1.3 The ***roleof extension*** in agricultural development is understood to deliver effective extension services 1.4 The ***importanceof Agricultural extension*** is determined to have appropriate knowledge, 1.5 ***Extension planning*** is understoodto determine extension activities
2. Apply Extension methods and Approaches	2.1. ***Extension methods*** are understood to provide Extension servicesbased on organizational standard, extension systems, extension strategy and extension guide lines 2.2. ***Extension approaches*** are understood for implementation of extension services 2.3. The ***importance of extension methods and approaches*** are understood for Agricultural extension service delivery 2.4. Appropriate extension methods and approaches are applied to transfer agricultural technologies, based on organizational standard, extension systems, extension strategy and extension guide lines,
3. Apply Agricultural Extension Communication and Facilitation for technology promotion	3.1. The concept***, principle*** and ***typeof communication*** is understood to have good extension communication knowledge & skill 3.2. ***Communication barriers*** are identified, understood and solved to undertake effective communication 3.3. ***Elements of extension communication*** are defined and used to create positive environment for communication 3.4. ***Audio visual techniques*** are understood to provide Agricultural Extension and communication delivery services 3.5. ***Roles*** and ***characteristics of extension communicator*** are recommended to improve the communicator's performance 3.6. The ***basic concept of facilitation*** is understood to improve facilitation skills 3.7. The ***roles and responsibilities of a facilitator*** is applied to progress facilitation skills 3.8. Conflict resolution skill is understood to enhance homogeneity 3.9. The ***skills of a facilitator*** are applied for communication & technology promotion
4. Conduct Training	4.1. ***Need assessment*** is conducted to provide appropriate training 4.2. ***Preparation*** is carried-out to facilitate the training process ***4.3.*** Implementation is conducted tocapacitate trainees based on

	organizational training guide line ***4.4. Evaluation is carried-out*** to understand the outcome
5. Record and Document Data	5.1 ***Data collecting formats*** are developed 5.2 Appropriate data are collected and organized 5.3 Collected and organized data are documentedand ***reported***

Variable	**Range**
Concept of Agricultural Extension	May include but not limited to: • Definition of agricultural extension • Purpose of agricultural extension
Evolution and progress of agricultural extension	May include but not limited to: • National Agricultural Extension systems • Related reading materials • Professionals • Electronic mail • Briefing notes • Journal articles • Code of conduct
Role of extension	May include but not limited to: • Situation analysis • Awareness creation • Training • Facilitation • Demonstrations • Field day exchange visit • Establish farmers group • Link farmers with relevant stakeholders • Monitoring and evaluation • Experience sharing • Assist and provide extension services for farmers • Organize farmer to farmer learning
Importance of Agricultural extension	May include but not limited to; • Identify problem • Find solution • Bring behavioural change • Transfer of technology • Assist farmers to help themselves
Extension planning	May include but not limited to: • Conduct survey • Identification of activities • Data collection • Development of formats

Extension methods	May include but not limited to: • Individual • Group • Mass
Extension approaches	May include but not limited to: • Participatory • Pluralistic • Farmers field school • Pastoral field school • Mobile extension • Model village • Cluster approaches • Scaling/up/out/down
Importance of extension methods and approaches	May include but not limited to: • Information and technology dissemination • Deliver extension message effectively • Increase knowledge of farmers • Bring attitude change • Formation of opinion • Encourage farmers to raise issues • To get/provide possible alternative solutions
Type of communication	May include but not limited: • Intra personal communication • Inter personal communication • Organizational communication
Principles of communication	May include but not limited to: • Awareness creation • Designed message with respect to objectives and respective audience • Message content should suite to the target audience
Communication barriers	May include but not limited to: • The use of jargons words/terms • Cultural differences • Lack of attention, interest, distractions • Differences in perception and viewpoint • Physical disabilities • Physical barriers to non-verbal communication • Language differences and the difficulty in understanding unfamiliar accents • Expectations and prejudices • Emotional barriers and taboos

Elements of extension communication	May include but not limited to: • Source • Sender • Message • Channel • Receiver
Audio visual techniques	May include but not limited to: • Audio visual aids • Assembling • Character • Advantages • Uses
Characteristics of extension communicator	May include but not limited to: • Confident • Friendly/ welcoming • Observant • Appreciative • Respectful • Organized • Good judgment • Consistent • Honest
Role of extension communicator	May include but not limited to: • Create motivation and feeling • Be aware of problem of the local people • Priority of direct needs • Create self-belief in rural people • Emphasis on self-depend aces • Change in social attitude • Rebuilding of the village • Full uses of local resources
Basic concept of facilitation	May include but not limited to: • Definition of facilitation • Purpose of facilitation • Evolution and progress of facilitation

Role and responsibilityof facilitator	May include but not limited to: • Does not evaluate group ideas • Helps the group focus its energies on a task • Suggests methods and procedures • Protects all members of the group from attack • Helps find win/win solutions • Makes sure that everyone has the opportunity to participate • Periodically summarizes the group consensus on issues to validate and clarify the progress of the discussion • Encouraging of every one's knowledge
Conflict resolution skill	May include but not limited to: • Recognize • Resolve conflicting needs • Relieve stress • Recognize and manage emotions • Improve nonverbal communication skills • Use humor and play to deal with challenges
Skill of facilitator	May include but not limited to: • Active Listening • Summarizing • Synthesis • Conflict resolution
Need assessment	May include but not limited to: • Identification of areas • Selection of respondents • Preparation of tools • Conduct the assessment • Organize data
Preparation	May include but not limited to: • Identify trainees and trainers • Organize logistics • Select Venue • Selecting and organize training materials • Select and Organize training aids • Prepare schedule and others
Evaluation	May include but not limited to: • Preparation of evaluating formats • Identify sample • Conduct evaluation • Organize result • Report
Data collecting formats	May include but not limited to: • Recording formats • Writing formats

Reporting	May include but not limited: • Organizing • Writing • Submitting/transfer

Evidence Guide	
Critical Aspects of Competence	Demonstrates knowledge and skill to : • Identify and interpret the role of Agricultural Extension • Apply Extension method and Approaches • Develop Extension planning • Perform Conflict resolution • collect, record, organize and document data
Required Knowledge and Attitudes	Demonstrates knowledge and attitude of : • Agricultural extension • Conflict resolution • Extension method and Approaches • Agricultural Extension Communication and Facilitation • collecting, recording, organizing and documenting of data
Required Skills	Demonstrates skills to: • Resolve conflict • Develop Extension planning • Apply extension method and Approaches • Facilitate Agricultural Extension Communication
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and Occupational health and safety (OHS) practices.
Methods of Assessment	Competence may be assessed through: • Written Test, Interview, quiz, practical assignment • Observation, Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level I	
Unit Title	**Implement Agribusiness Marketing**
Unit Code	**AGR MEM1 11 0322**
Unit Descriptor	This unit covers the knowledge, skills and attitude required to Understand concept of agricultural marketing Understand concepts of agribusiness Identify marketing targets for Agricultural products Implement marketing strategy . Establish contract farming, and Apply Agricultural marketing services.

Element	Performance Criteria
1. Understand concept of agricultural marketing	1.1 ***.Concept of agricultural marketing*** is understood for Agricultural marketing 1.2 Importance of agricultural marketing is understood to provide agricultural marketing services 1.3 ***.Roles of*** **agricultural market**-oriented service is identified and understood 1.4 ***.Principles of agricultural marketing*** and strategies are identified and understood 1.5 ***Marketing mix*** is understood to implement agricultural marketing activities 1.6 ***Types of marketing*** are understood and identified to implement the appropriate marketing services
2. Understand concepts of agribusiness	2.1***. Concept of agribusiness*** is understood for Agricultural marketing 2.2 Importance of agribusiness is understood to provide agribusiness services 2.3 ***Roles of agribusiness***-oriented service is identified and understood 2.4 ***Principles of agribusiness*** and strategies are identified and understood 2.5. **Characteristic of Agribusines**s are understood to implement Agribusiness 2.6. **Dimension** and s**tructures** of Agribusiness are understood and distinguished
3. Identify marketing targets for Agricultural products	3.1 .***Marketing targets*** are identified for Agricultural products and services 3.2 ***Approaches*** **of** ***agricultural market*** are understood for agricultural market product and service. 3.3 ***Segment descriptors*** are used to display the targets of agricultural market 3.4 ***Strategic of agricultural marketing options*** are identified to develop agricultural ***marketing plan*** 3.5 Business plans are prepared to perform cost and benefit analysis
4. Implement marketing strategy	4.1 .Agricultural marketing functions strategy is designed to perform agriculture business. 4.2 ***Action plan*** is developed to implement Agricultural marketing strategies**.** 4.3 .Require resource are identified and coordinated to implement agricultural marketing 4.4Marketing mix is implemented according to the strategy Agricultural.
5. Establish contract farming	5.1 Concept of ***contract farming*** is understood to enhance market oriented production 5.2 ***Types of contract farming*** are identified to select the appropriate approach 5.3 ***Models of Contract*** farming are understood and identified 5.4. Steps and procedures of contract farming establishments are identified 5.5 Contract farming ***requirements*** are identified and applied based on the organizational standard 5.6 Contract farming systems are established
6. Apply Agricultural marketing services	6.1 Agricultural products are identified to delivered provided marketing services 6.2 Need assessment is conducted to identify ***marketing conditions*** 6.3 ***Market strategies*** are developed to implement the Agricultural marketing services 6. 4Customer feedbacks are collected and organized to improve Agricultural marketing services 6.5 Data is organized and documented to report the appropriate body.

Variable	Range
Concept agricultural marketing	May include, but not limited to: • Needs • Product • Demand • Value • Transaction • Satisfaction and Quality • Exchange • Market
Roles marketing	May include but not limited to: • Determine price • Consumer choice • Increase efficiency • Improve scarcity
Principles agricultural marketing	May include but not limited to: • Product • Price • promotion • Place • People • Process
Marketing mix	• May include, but not limited to: • Price • Promotion • Place • Product
Types of marketing	May include, but not limited to • Perfect competitive • Monopoly • Oligopoly • Monopolistic
Concept of Agribusiness	May include, but are not limited to: • Agricultural impute supply • Farmer producer • Process of wholesaler • Distribution and retailer

Characteristic of Agribusiness	May include but not limited to: • Existence around production areas • Variety and size of Ag organization • Scale and type of competition • Conservativeness of Ag: • Decision making: • Community oriented business
Dimension	May include, but not limited to: • Agricultural sector and their interdependence • farm either private or government • Market oriented. • Dynamic sector and continuously meets current demands of consumers • Provides forward and backward linkages
Structures	May include but not limited to: • Input sector: • Farm/production sector: • Product sector:
Marketing targets	May include but not limited to: • Demographic • Geographic • Psychographic • Behaviours pattern
Marketing conditions	May include but not limited to: • Government • International transaction • Speculation and expectation • Supply and demand
AgriculturalMarket strategies	• May include, but not limited to: • Analyse agricultural market • Analyse competition • Define market mix • Determine position • Marketing budget • Execution plan understand potential customers
Approaches for agricultural market	• May include, but not limited to: • Functional • Institution • Commodity • Behavioural

Segment descriptors	• May include, but not limited to: • Demographic • Behavioural • Geographic • Psychographic
Marketing plans	• May include, but not limited to • Function of marketing • Market program • Achieve the market objectives
Action plan	• May include, but not limited to: • Resource • Budget • Times • Output
Contract farming	May include, but not limited to • Agreement between buyer and seller • Farmer and processing making firms for production • Supplies of agricultural product
Types of contract farming	May include, but not limited to • Market specifying • Recourse providing • Production management
Models of Contract	May include, but not limited to • Full model contract farming • Specific
Requirements	• Traceability • Site history and management • Propagation material • Soil/substrate management • Fertilizer use • Irrigation • Crop protection

Evidence Guide

Critical Aspects of Competence	Must demonstrate skills and knowledge to: • Understand Concept of agribusiness to apply agribusiness marketing • Identify Principles of agribusiness and strategies to implement Agribusiness marketing • Determine Agricultural Marketing targets for provide products and services • Develop Action plan to implement Agricultural marketing strategies**.** • Prepare Business plans to perform cost and benefit analysis • Apply marketing conditions to conducted Need assessment for products and service • Understand concept of contract farming to enhance market oriented production • Apply appropriate models to established contract farming • Contract farming requirement***s*** are identified and applied based on the organizational guide line • Established Contract farming systems based on the organizational standard
Required Knowledge and Attitude	Demonstrate knowledge of : • Principles of agricultural marketing to implement marketing strategy • Concept of agribusiness to apply agribusiness marketing • the roles of agribusiness to perform agricultural marketing. • Principles of agribusiness and strategies to implement Agribusiness marketing • Agricultural Marketing targets that provide products and services • Required resource to implement agricultural marketing • concept of contract farming to enhance market oriented production • appropriate models to established contract farming • Contract farming systems based on the organizational standard
Required Skills	Demonstrate Skills to : • Determine ***marketing options*** to design marketing plan • Implement Agricultural marketing strategies develop action plan • Identified Agricultural Marketing targets for provide products and services • Select ***Approaches*** of agricultural market to implement product and service. • ***Use segment descriptors*** to display the targets of agricultural market • Develop Action plan to implement Agricultural marketing strategies. • Prepare Business plans to perform cost and benefit analysis • Apply marketing conditions to conducted Need assessment for products and service • Organize customer feedbacks to improve Agricultural marketing services • Apply appropriate models to established contract farming • Contract farming requirement***s*** to applied based on the organizational guide line • Established Contract farming systems based on the organizational standard
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level I	
Unit Title	**Apply Basics of Human Nutrition Practices**
Unit Code	**AGRMEM1 14 0322**
Unit Descriptor	This unit covers the knowledge, skill and attitude required to categorize agricultural foods items, recognize malnutrition in the community, identify the role of agriculture in nutrition and contribute to the awareness creation of the community in utilization of agricultural products.

Element	Performance Criteria
1. Identify Categories of agricultural foods items	1.1. Basic ***terminologies and concepts*** in nutrition are identified and explained 1.2. ***Food groups,nutrient and theirsources*** of balanced diet are identified and explained 1.3. ***Origin***and composition of food stuffs are identified and described 1.4. ***Energy dense*** and ***nutrient dense*** food sources are identified and explained
2. Recognize malnutrition in the community	2.1. Physical signs of malnutrition are identified and explained 2.2. Forms, causesand consequencesof ***malnutrition*** in different groups of community are identified 2.3. Measures to overcome malnutrition, importance of maintenance of adequate and balanced diet are promoted 2.4. Contribution is made in elders, family heads and women awareness creation programs
3. Identify the role of agriculture in nutrition	3.1. The role of agriculture as source of variety foods is recognized and promoted 3.2. The contribution of agriculture sector in nutrition sensitive intervention is described 3.3. ***Nutrition sensitive agriculturalpractices*** are identified and communicated as per the nutrition program guideline

4. Demonstrate diversified Agricultural food production and consumption techniques	4.1. Importance of diet diversification is identified and discussed with family holds and community according to the program guideline 4.2. Techniques of diversified food production are identified and demonstrated to farmers and family members 4.3. ***Techniques of enhancing*** the nutrient content of family foods are assessed and implemented according to the program guideline and cultural requirements of the rural community 4.4. Utensils are identified and cooking techniques demonstrated for specific agricultural products 4.5. PPE are selected and used in accordance to OHS requirement and code of ethics 4.6. Balanced and nutrient dense diet preparation is demonstrated using food stuff ingredients
5.Perform proper handling and storage of agricultural food products	5.1. Importance of ***hygiene*** for nutrition is explained 5.2. ***Storagefacilities*** are identified and family holds supported in construction. 5.3. Agricultural products are ***safely handledandstored*** 5.4. Methods and techniques of safely handling and storing agricultural products are demonstrated in accordance products requirement
6.Document and report food production, consumption and difficulties	6.1. Diversified food production and consumption activities are documented 6.2. Difficulties happened in the processes are reported to the respective authorities.

Variable	**Range**

Terminologies and concepts	May include, but not limited to: • Food • Diet • Nutrient • Balanced Diet • Nutritious food • Hidden hunger • Malnutrition • Stunting • Underweight • Overweight • Nutrition • Diversification • Body growth • Body Development • Food fortification • Bioavailability • Food taboos • Window of opportunity • Fortification • Food security • Nutrition security • Small holder farmer • Cretinism
Food groups	May include, but not limited to: • Vegetables food group • Fruits food group • Legumes and nuts food group • Animal source food group • Fats oils and sweets food group • Staples food group
Nutrient and their sources	May include, but not limited to: • Carbohydrates • Lipids/Fats • Proteins • Minerals • Vitamins
Food origin	May include, but not limited to: • Animal • Plant
Energy dense	May include, but not limited to: • Calories • Nutrient

Nutrient dense	May include, but not limited to: • Vitamins • Minerals • Fibbers
Malnutrition	May include, but not limited to: • Under nutrition may be: ➢ stunting ➢ wasting ➢ underweight • Over nutrition may be: ➢ obesity ➢ overweight
Nutrition sensitive agricultural practices	May include, but not limited to: • Nutrition sensitive agricultural intervention • Diversification in: ➢ Production of fruits, vegetable, nutritious roots, cereals, pulse, and mushroom ➢ Animal source foods (Dairy, poultry, shoat, fish)
Techniques of enhancing	May include, but not limited to: • Fortification, • Germination, • Fermentation, • Roasting and Cooking
Hygiene	May include, but not limited to: • Food hygiene • Personal hygiene • Environmental hygiene
Storage facilities	May include, but not limited to: • Bins • Refrigerator • Shelf • Rack and Barn
Safely handling and storing	May include, but not limited to: • Sanitation • Ventilation

Evidence Guide

Critical Aspects of Competence	Demonstrate knowledge and skills to: • Use utensils and prepare balanced nutrition • Distinguish and demonstrate energy dense and nutrients- dense foods and preparation techniques • Demonstrate food storing and preserving techniques • Explain the need for variety and diversification of foods • Explain agricultural food types, and sources • Describe forms, causes and consequences of excess or deficient intake of certain food types • Maintain personal hygiene to minimize risk to food product safety
Required Knowledge and Attitude	Demonstrate knowledge of: • Terminologies and concepts of nutrition • OHS requirements • Food groups and nutrient composition and diet requirement • Adequate and balanced diets • Agricultural food types, and sources • Need for variety and diversification of family diet with a variety of agricultural food products • Basic principles of producing quality/ nutritious agricultural products • Effect of food production and /or preparation on nutrient content of a variety of energy- dense and nutrients- dense foods • Child and maternal nutrition • Forms, causes and consequences of malnutrition • Basic food safety principles and requirements • Hygiene and food safety procedures • food safety recording requirements • Common hazards and sources of contamination in area of work • Legal and regulatory requirements pertaining to food production, storage, handling and packaging relevant to area of work • Personal hygiene practices and clothing requirements relevant to area of work.

Required Skills	Demonstrate skills to: • Categorize agricultural food items into major food groups based on their nutrient contents • Identify local varieties of animal and plant products, • Demonstrate production and /or preparation of nutrient rich diets • Communicate appropriate information with regard to diversified foods for pregnant women and children • Demonstrate various methods of integrated nutritious agricultural products production • Identify the consequences of excess or deficient intake of certain food types • Demonstrate how to enhance nutrient content using different food groups • Handle food .products to prevent damage, spoilage and waste • Identify hazards, contaminants and risks or control points • Document and report food safety hazards and risks to appropriate personnel • Store food products in appropriate areas at correct temperatures
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard:	Agricultural Machinery and Equipment Maintenance Level I
Unit Title	**Apply 5S Procedures**
Unit Code	**AGR MEM1 13 0322**
Unit Descriptor	This unit 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.

Elements	Performance Criteria
1. Prepare for work.	1.1. Work instructions are used to determine job requirements, including method, material and equipment. 1.2. Job specifications are read and interpreted following working manual. 1.3. ***OHS requirements***, including dust and fume collection, breathing apparatus and eye and ear personal protection needs are observed throughout the work. 1.4. ***Tools and equipment*** are prepared and used to implement 5S. 1.5. ***Safety equipment and tools*** are identified and checked for safe and effective operation. 1.6. Kaizen Board (Visual Management Board) is prepared and used in harmony with different workplace contexts.
2. Sort items.	2.1. Plan is prepared to implement sorting activities. 2.2. Cleaning activities are performed. 2.3. All ***items*** in the workplace are identified following ***the appropriate procedures***. 2.4. Necessary and ***unnecessary items*** are listed using the ***appropriate format***. 2.5. ***Red tag*** strategy is used for unnecessary items. 2.6. Unnecessary items are evaluated and placed in an appropriate place other than the workplace. 2.7. ***Necessary items*** are recorded and quantified using appropriate format. 2.8. Performance results are reported using appropriate formats. 2.9. Necessary items are regularly checked in the workplace.
3. Set all items in order.	3.1. Plan is prepared to implement set in order activities. 3.2. General cleaning activities are performed. 3.3. Location/Layout, storage and indication methods for items are decided. 3.4. Necessary tools and equipment are prepared and used for setting in order activities. 3.5. Items are placed in their assigned locations. 3.6. After use, the items are immediately returned to their assigned locations.

	3.7. Performance results are reported using appropriate formats. 3.8. Each item is regularly checked in its assigned location and order.
4. Perform shine activities.	4.1 Plan is prepared to implement shine activities. 4.2 Necessary tools and equipment are prepared and used for shinning activities. 4.3 ***Shine activity*** is implemented using appropriate procedures. 4.4 Performance results are reported using appropriate formats. 4.5 Regular shining activities are conducted.
5. Standardize 5S.	5.1. Plan is prepared and used to standardize 5S activities. 5.2. ***Tools and techniques to standardize 5S*** are prepared and implemented based on ***relevant procedures***. 5.3. Checklists are followed for standardize activities and ***reported*** to ***relevant personnel***. 5.4. The workplace is kept to the specified standard. 5.5. Problems are avoided by standardizing activities.
6. Sustain 5S.	6.1. Plan is prepared and followed to sustain 5S activities. 6.2. Tools and techniques to sustain 5S are discussed, prepared and implemented based on relevant procedures. 6.3. Workplace is inspected regularly for compliance to specified standard and sustainability of 5S techniques. 6.4. Workplace is cleaned up after completion of job and before commencing next job or end of shift. 6.5. Situations are identified where compliance to standards is unlikely and actions specified in procedures are taken. 6.6. Improvements are recommended to lift the level of compliance in the workplace. 6.7. Checklists are followed to sustain activities and report to relevant personnel. 6.8. Problems are avoided by sustaining activities.

Variable	**Range**
OHS requirements	May include, but not limited to: • Legislation/Regulations/Codes of practice and enterprise safety policies and procedures. This may include protective clothing and equipment, use of tooling and equipment, workplace environment and safety, handling of material, use of fire fighting equipment, enterprise first aid, hazard control and hazardous materials and substances. • Personal protective equipment is to include that prescribed under legislation/regulations/codes of practice and workplace policies and practices.

	• Safe operating procedures are to include, but are not limited to the conduct of operational risk assessment and treatments associated with workplace organization. • Emergency procedures related to this unit are to include but may not be limited to emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation.

Tools and equipment	May include, but not limited to: • Paint • Hook • Sticker • Signboard • Nails • Shelves • Chip wood • Sponge • Broom • Pencil • Shadow board/Tools board
Safety equipment and tools	May include, but not limited to: • Dust masks/goggles • Glove • Working cloth • First aid and safety shoes
Items	May include, but not limited to: • Tools • Jigs/Fixtures • Materials/components • Machine and equipment • Manuals • Documents • Personal items (e.g. Bags, lunch boxes and posters) • Safety equipment and personal protective equipment • Other items which happen to be in the work area
The appropriate procedures	May include, but not limited to: • Steps for implementing 5S (sort, set in order and shine) activities. • Written, verbal and computer based or in some other format.
Unnecessary items	Are not needed for current production or administrative operation and include but not limited to: • Defective or excess quantities of small parts and inventory • Out dated or broken jigs and dies • Worn-out bits • Out dated or broken tools and inspection gear • Old rags and other cleaning supplies • Electrical equipment with broken cords • Out dated posters, signs, notices and memos • Some locations where unneeded items tend to accumulate • In rooms or areas not designated for any particular purpose • In corners next to entrances or exists

	• Along interior and exterior walls • Next to partitions and behind pillars • Under the eaves of warehouses • Under desks and shelves and in desk and cabinet drawers • Near the bottom of tall stacks of items • On unused management and production schedule boards • In tools boxes that are not clearly sorted

Appropriate format	May include, but not limited to: • All items, necessary and unnecessary items.
Red tag	A format prepared with a red color paper or card which is filled and attached temporarily on the unnecessary items until decision is made. The red tag catch people's attention because red is a color that stands out. So to fill and attach red tag on items, asks the following three questions: • Is this item needed? • If it is needed, is it needed in this quantity? • If it is needed, does it need to be located here?
Necessary items	Are required in the workplace for current production or administrative operation in the amount needed.
Shine activity	May include, but not limited to: • Inspection • Cleaning • Minor maintenance May include, but not limited to: ➢ Tightening bolts ➢ Lubrication and Replacing missing parts
Tools and techniques to standardize 5S	May include, but not limited to: • 5S Job Cycle Charts • Visual 5S • The Five Minute 5S • Standardization level checklist • 5S checklist • The five Whys and one How approach(5W1H) • Suspension • Incorporation and Use Elimination • 5S slogans • 5S posters • 5S photo exhibits and storyboards • 5S newsletter • 5S maps • 5S pocket manuals • 5S department/benchmarking tours • 5S months • 5S audit • Awarding system • Big cleaning day • Patrolling system May include, but not limited to: ➢ Top management Patrol ➢ 5S Committee members and Promotion office Patrol ➢ Mutual patrol ➢ Self-patrol • Checklist and Camera patrols

Relevant procedures	May include, but not limited to: • Assign 5S responsibilities • Integrate 5S duties into regular work duties • Check on 5S maintenance level • OHS measures such as signage, symbols / coding and labelling of workplace and equipment • Creating conditions to sustain your plans • Roles in implementation
Reporting	May include, but not limited to: • Verbal responses • Data entry into enterprise database • Brief written reports using enterprise report formats
Relevant personnel	May include, but not limited to: • Supervisors, managers and quality managers • Administrative, laboratory and production personnel • Internal/external contractors, customers and suppliers

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge to: • Discuss how to organize KPT. • Describe the pillars of 5S. • Discuss the relationship between Kaizen elements. • Implement 5S in own workplace by following appropriate procedures and techniques.
Required Knowledge and Attitudes	Demonstrates knowledge of: • Kaizen principle, pillars and concept • Key characteristic of Kaizen • Elements of Kaizen • Wastes/MUDA • Basics of KPT • Aims, benefits and principles of KPT • Stages of KPT • Structure and role of the components of Junior KPT • Concept and parts of Kaizen board • Concept and benefits of 5S • The pillars of 5S • Three stages of5S application • Benefits and procedure of sorting activities • The concept and application of Red Tag strategy • Relevant Occupational Health and Safety (OHS) and environment requirements • Benefits and procedure of set in order activities

	• Set in order methods/techniques • Benefits and procedure of shine activities • Inspection methods • Planning and reporting methods • Method of Communication • Benefits of standardizing and sustaining 5S • Tools and techniques to sustain 5S • Ways to improve Kaizen elements • Benefits of improving kaizen elements • Relationship between Kaizen elements
Required Skills	Demonstrates skills of: • Participating actively in KPT • Technical drawing • Communication skills • Planning and reporting own tasks in implementation of 5S • Following procedures to implement 5S in own workplace • Using sorting formats to identify necessary and unnecessary items • Improving workplace layout following work procedures • Preparing labels, slogans, etc. • Reading and interpreting documents • Observing situations • Gathering evidence by using different means • Recording activities and results using prescribed formats • Working with others • Solving problems by applying 5S • Preparing and using kaizen board • Preparing and using tools and equipment to implement and sustain 5S • Improving Kaizen elements by applying 5S • Standardizing and sustaining procedures and techniques to avoid problems • Procedures to standardizing 5S activities • Analysing and preparing shop layout of the workplace • Standardizing and sustaining checklists
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

NQFL II

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level II	
Unit Title	**Perform Arc and Oxy Acetylene Welding**
Unit Code	**AGR MEM2 01 0322**
Unit Descriptor	This unit of competency covers the skills and knowledge required to carry out manual metal arc and routine oxy acetylene welding procedures. The unit includes identification and confirmation of work requirement, preparation for work and the completion of welding and work finalisation processes, including clean-up and documentation.

Elements	Performance Criteria
1. Identify weld requirements	1.1 ***OHS requirements*** and ***Personal Protection Equipment (PPE)*** needs are applied throughout the work. 1.2 Materials tools and equipment are identified and prepared 1.3 Weld requirements are identified. 1.4 Location of welds is identified in accordance with standard operating procedures and job specifications.
2. Prepare for work	2.1 Work instructions are used to determine job requirements, including job sheets, quality and quantity of ***materials***. 2.2 Job specifications are read and interpreted. 2.3 Materials are identified and prepared for welding operation 2.4 Cleaned and inspected materials ready for welding quality are prepared 2.5 Tools and safety equipment are prepared and applied. 2.6 Products are determined to minimise waste material. 2.7 Procedures are identified for maximising energy efficiency while completing the job.
3. Carry out arc welding procedures	3.1 ***Information*** is accessed from sources to enable welding to be performed. 3.2 Manual metal arc welding is carried out according to a standard 3.3 ***Manual metal arc welding*** is completed according to type of material and repairs required. 3.4 Manual metal arc welding procedures are completed without causing damage.
4. Perform oxy acetylene Welding	4.1 Safe welding practices are applied according to the ***safe operating procedures***. 4.2 Materials are welded to ***job requirements***. 4.3 Welds are ***cleaned*** in accordance with standard operating procedures.

5. Clean up work area and maintain equipment	5.1 Material that can be reused is collected and stored. 5.2 Waste and scrap are removed following workplace procedures. 5.3 Equipment and work area are cleaned and inspected for serviceable conditions in accordance with workplace procedures. 5.4 Unserviceable equipment is tagged and faults are identified. 5.5 Operator maintenance is completed. 5.6 Tooling is maintained in accordance with workplace procedures.

Variable	**Range**
Materials	May include but not limited to : • Rods/electrodes and cleaning materials • Mild and low carbon steel and cast iron • Filler rods, fluxes • Oxy- acetylene gas • Oxy- acetylene cylinder • Oxygen cylinder • Hoses • Valves, gauges and regulators • Carts • Wire brush • Cutting and welding torch • Electrode holder • Clamp • Slag remover …
OHS requirements	May include but not limited to : • Protective clothing and equipment • Use of tooling and equipment • workplace environment and safety • Handling of material • Use of fire fighting equipment, enterprise first aid • Hazard control and hazardous material and substances
Information	May include but not limited to : • Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches • Safe work procedures related to manual metal arc welding • Regulatory/legislative requirements pertaining to automotive industry, including ethiopian design rules • Engineer's design specifications and instructions • Organisation work specifications and requirements • instructions issued by authorised enterprise or external persons • Ethiopian standards
Manual metal arc welding method	May include but not limited to : • Equipment selection and preparation,

	• Material selection/ confirmation and preparation, • The application of welding techniques and the operator maintenance of equipment
Safe operating procedures	May include but not limited to : • Operational risk assessment and treatments associated with vehicular movement, toxic substances, electrical safety, equipment movement and operation, manual and mechanical lifting and shifting, working in proximity to others and worksite visitors • Emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and worksite evacuation
Job requirements	May include but not limited to : • Waste management, noise, dust and clean-up management • Regulations, including ethiopian standards, internal company quality policy and standards and enterprise operations and procedures
Tooling and equipment	May include but not limited to : • Hand tooling • Welding equipment including: ➢ Manual metal arc welding machines, ➢ Safety equipment, ➢ Measuring equipment, ➢ Marking out equipment and lifting equipment , ➢ Hoses, blowpipes, regulators
Prepared	May include but not limited to : • Preheating • Setting up jigs • Fixtures • Clamps • Joint preparation
Oxy acetylene	May include but not limited to : • The term 'oxy-acetylene' is used here to describe a range of fuel gases, including acetylene, LPG, hydrogen etc.
Communications	May include but not limited to : • Verbal and visual instructions and fault reporting and may include: ➢ Worksite specific instructions ➢ Written instructions ➢ Plans or instructions related to job/task ➢ Telephones and pagers

Evidence Guide	
Critical Aspects of Competence	Must demonstrate skills and knowledge competence to : • Safety procedures and requirements • Selecting methods and techniques appropriate working area • Completing preparatory activity in a systematic manner • Setting up, operating and maintaining manual metal arc welding, safety, lifting and measuring equipment • Performing welding activity with required standards • Completing a range of manual metal arc welding tasks to

	specification • Setting up, operating and maintaining oxy – acetylene welding
Required Knowledge and Attitudes	Demonstrate knowledge of: • Application of personal protective equipment for routine oxy acetylene welding • OHS regulations/requirements, equipment, material and personal safety requirements • Types of metals, electrodes and their application • Manual metal arc welding and oxyacetylene procedures • Procedures for reporting faults and material defects • Equipment and equipment settings • Gas properties and applications • Welding material property • Types of arc welding joints
Required Skills	Demonstrate skills to: • Applyarc welding and oxyacetylene procedures • Establish safe and effective work processes which anticipate and/or resolve problems and downtime. • Systematically avoid or minimise reworking and wastage • Use workplace technology related to welding systems, • Setting up welding equipment • Welding with oxy acetylene gas • Reading and interpreting routine information on written job instructions, specifications and standard operating procedures • Using measurement skills for joint preparation and routine oxy acetylene and arc welding
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level II	
Unit Title	**Repair and Overhaul Starting and Charging Systems/Components**
Unit Code	**AGR MEM2 02 0322**
Unit Descriptor	This unit covers the skills and knowledge required to Reassemble and clean-up work area, repair starting and charging systems and associated components, test systems/ components and identify faults and dismantle starting motors and alternator.

Elements	Performance Criteria
1. Prepare for work	1.1 Job requirements, including method, processes and equipment are determined. 1.2 Workplace **information sources** are accessed and procedures strictly adhered. 1.3 Information of manuals and manufacturer specifications are read and interpreted. 1.4 ***Equipment, tools and materials*** are identified, checked and prepared for effective and safe operation. 1.5 Procedures are determined to minimise time and wastage.
2. Dismantle starting motors and alternator	2.1 **Occupational Health and Safety (OHS) requirements** including regulatory requirements and Personal Protective equipment (PPE)are used in according to workplace requirements. 2.2 ***Safe operating procedures*** are applied during the use of tools/ equipment in accordance with workplace guidelines. 2.3 **Starting systems** motors and alternator are dismantled according to machinery manufacturer procedures without causing damage to component. 2.4 Component parts are cleaned according to the recommended solvents and cleaning agents with the procedure
3. Test systems/ components and identify faults	3.1 **Emergency procedures** are followed as per organization's guideline. 3.2 Tests are carried out to determine ***faults*** using appropriate tools and techniques. 3.3 Tests are completed without causing damage to component or system. 3.4 Test results are documented and used to apply the preferred ***repair method*** and technique. 3.5 Tests are completed according to manufacturer's guidelines
4. Repair starting and charging systems and associated components	4.1 Appropriate tools/equipment, techniques and materials are selected and used. 4.2 Repairs, component replacement and adjustments are carried out to manufacturer/component maintenance specification. 4.3 Final testing is performed to ensure correct and safe starting

	and charging system operation, according to manufacturer's guidelines
5.Reassemble and clean-up work area	5.1 Dismantled parts of the starter and alternator are reassembled according to manual instructions 5.2 Waste and scrap are removed by following workplace procedures. 5.3 Equipment and work area are cleaned and inspected for serviceable condition in accordance with workplace procedures. 5.4 Unserviceable components are tagged and reported for decision in accordance with workplace requirements. 5.5 Tools and equipment are maintained in accordance with workplace procedures. 5.6 Material that can be reused is collected and stored. 5.7 Work performed documented and completed in accordance with ***enterprise requirements***

Variable	**Range**
Information sources	May include but not limited to: • Verbal or written and graphical instructions, compliant report, work schedules/plans/specifications, • Work bulletins, memos, material safety data sheets, schematic drawings or sketches • Safe work procedures related to installation and repair of machineries and trailer wiring/lighting systems • International Design Rules, engineer's design specifications and instructions. • International standards • Persons
Equipment and tools	May include but not limited to: • Hand tools • Electrical testing equipment, including test light, clamp ohmmeter, multi meters, voltmeters and ammeters • Power tools • Electrical loading equipment • Test benches for starter and alternator. • Soldering equipment. • Electrical board.
Materials	May include but not limited to: • Copper wires • Soldering flux • Cleaning agents • Insulating tape. • Brushes with holders
Occupational Health and Safety (OHS)requirements	May include but not limited to • Personal protective equipment and clothing

	• Workplace environment and safety, safety equipment • Enterprise first aid and equipment • Hazard and risk control and hazardous materials and substances electrical safety • Elimination of hazardous materials and substances • Emergency procedures • Use of tools and equipment, • Handling of material, • Use of fire fighting equipment,
Safe operating procedures	May include, but not limited to : • Operational risk assessment and treatments associated with vehicular movement, toxic substances, electrical safety, machinery movement and operation, manual and mechanical lifting and shifting, • Working in proximity to others and site visitors • Emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation
Mechanical starting systems	May include but not limited to : • Pull rope • Crank handle • Inertia
Emergency procedures	May include but not limited to: • Emergency shutdown and stopping of equipment, • Fire extinguishers, • Enterprise first aid requirements and site evacuation directional strategies
Faults	May include but not limited to: • Failure to start • Slow or noisy operation • Open, short and ground circuits • Charging problem • Alternator drive belt problems • Regulator malfunction. • Internal alternator faults, • Diodes, bearings and worn out components…
Repair methods	May include but not limited to: • Reading/interpreting wiring diagrams • Fault-finding using, visual and functional assessments for damage, corrosion, wear and electrical short/broken circuits • Using testers and electrical measurements • Diagnosis and determining faults • Pre- and post-repair testing of system and component operation • Removal and servicing • Repair/replacement of system components • Calibrating and adjustments
Organizational policies and procedures	May include but not limited to : • Quality policies and procedures, including Relevant Ethiopian standards

	• OHS, sustainability, environment, equal opportunity and anti-discrimination • Manufacturer specifications and industry codes of practice • Safe work procedures • Reporting and recording procedures
Environmental requirements	May include but not limited to: • Waste management • Pollution • Noise • Dust • Clean-up management
Legislative requirements	May include but not limited to • Award and enterprise agreements • Industrial relations • International standards • International design rules • Confidentiality and privacy • OHS • The environment • Equal opportunity • Relevant industry codes of practice • Duty of care • Waste management • Pollution • Noise • Dust • Clean-up management • Regulations, including international standards • Internal organizational quality policies and procedures • Enterprise operations and procedures

Evidence guide	
Critical Aspects of Competence	Must demonstrate skills and knowledge in: • Observe safety procedures and requirements • Select methods and techniques appropriate to the performance. • Complete preparatory activity using the required technique and method. • Dismantle and reassemble works performed • Test starting systems/components • Test charging systems/components • Diagnose and determine faults • Repair starting systems and charging systems comparing with manufacturer/component maintenance instructions • Post-repair test starting systems to manufacturer/component supplier requirements • Complete workplace and equipment documents

Required Knowledge and Attitudes	Must demonstrate knowledge of: • OHS regulations/requirements, equipment, material and personal safety requirements • Types of starting system (mechanical, electrical) • Charging system principles of operation • Construction and operation of charging systems relevant to application • Enterprise quality procedures • Written communication and report writing skills procedures relevant to application • Oral communication skills procedures relevant to application
Required Skills	Must demonstrate skills to: • Interpret and apply manufacturer/component procedures • Technical skills - to use workplace technology and tools. • Communication skills - to confirm work requirements and specifications, • Dismantle and reassemble • Testing and major repairs/component replacement • Problem identification and solving skills. • Resolve problems, downtime and to develop solutions to avoid or minimise reworking and avoid wastage • team skills - to work effectively and cooperatively with others to optimise workflow and productivity
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be accessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level II	
Unit Title	**Service and Repair Engine Systems**
Unit Code	**AGR MEM2 03 0322**
Unit Descriptor	This unit covers the competence skills and knowledge require to identification and confirmation of work requirement, preparation for work, inspection, servicing and repair of engines systems and completion of work finalisation processes, including clean-up and documentation.

Elements	Performance Criteria
1. Prepare to undertake the inspection	1.1 **Workplace *information sources*** are **accessed** and interpreted**.** 1.2 ***OHS requirements*** and ***Personal Protective Equipment*** needs are applied throughout the work 1.3 Procedures and information such as workshop manuals and specifications, and tooling required are identified. 1.4 Resources required for inspection of ***engine systems*** are sourced and support equipment is identified and prepared. 1.5 Technical requirements for inspection are sourced and support equipment is identified and prepared. 1.6 Warnings are observed in relation to working with ***engine systems*** and ***system variables***
2. Service Engine fuel system	2.1 Methods and sequence for diesel fuel system inspection and servicing are implemented 2.2 Servicing petrol fuel system are implemented 2.3 Replacement and adjustments works are applied during the repair 2.4 Hazards prevention and warnings are applied in relation to working with diesel fuel injection systems.\ 2.5 Engine fuel system is checked and serviced according repair manual instruction 2.6 Troubleshoot of engine fuel system is identified and carried out in accordance to maintenance manual 2.7 Hazards prevention and warnings are applied in relation to working with diesel fuel injection systems. 2.8 Final inspection is made to ensure work is to workplace expectations.
3. Servicing Cooling and Lubrication system	3.1 Methods and sequence for cooling and lubricating system inspection and servicing are implemented 3.2 Replacement and adjustments works are applied during the repair 3.3 Hazards prevention and warnings are applied in relation to working with cooling and lubricating systems.\ 3.4 Engine cooling and lubricating is checked and serviced

	according repair manual instruction 3.5 Troubleshoot of cooling and lubricating system is identified and carried out in accordance to maintenance manual 3.6 Hazards prevention and warnings are applied in relation to working with cooling and lubricating systems. 3.7 Final inspection is made to ensure work is to workplace expectations.
4. Servicing intake and exhaust system	4.1 Methods and sequence for intake and exhaust system inspection and servicing are implemented 4.2 Replacement works are applied during the repair 4.3 Hazards prevention and warnings are applied in relation to working with intake and exhaust system. 4.4 Engine intake and exhaust system is checked and serviced according repair manual instruction. 4.5 Troubleshoot of engine intake and exhaust system is identified and carried out in accordance to maintenance manual 4.6 Turbocharger is checked and serviced according to manufacturer repair manual 4.7 Hazards prevention and warnings are applied in relation to working with intake and exhaust system systems. 4.8 Final inspection is made to ensure work is to workplace expectations.
5. Prepare engine system for use or storage	5.1 Servicing schedule documentation is completed. 5.2 Equipment/tools and work area are cleaned and inspected for serviceable condition. 5.3 Waste and scrap are removed by following workplace procedures. 5.4 Final inspection after service is made to each systems to ensure protective guards, safety features and cowlings are in place. 5.5 Job card is processed in accordance with workplace procedures. 5.6 Performances are recorded, reported and documented.

Variable	**Range**
Information sources	May include but not limited to : • Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches • Safe work procedures related to inspection and servicing of engines • Regulatory/legislative requirements pertaining to the automotive industry, including International Design Rules • Engineer's design specifications and instructions • Organisation work specifications and requirements • Instructions issued by authorised enterprise or external persons • International Standards

Engine system	May include but not limited to • Fuel System (diesel and gasoline) • Lubrication system • Cooling system • Induction system • Exhaust system
Engine Fuel system components	May include but not limited to: • fuel filter (primary and secondary) • fuel lines • fuel feed pump • Fuel Tank • Fuel pump (Gasoline) • Injector • carburettor
OHS requirements	May include but not limited to: • Personal protective equipment and clothing • Safety equipment • First aid equipment • Hazard and risk control • Electrical safety • Elimination of hazardous materials and substances • Manual handling, including shifting, lifting and carrying • Emergency procedures
Methods	May include but are not limited to: • Visual, aural and functional assessments, including, damage, corrosion, fluid levels/leaks, noise and wear
Safe operating procedures	May include but are not limited to: • The conduct of operational risk assessment and treatments associated with vehicular movement, electrical safety, manual lifting and shifting, working in proximity to others and site visitors
Inspection of engine systems	May include but are not limited to: • Inspection and servicing of engine systems includes the assessment and adjustment/replacement of components in accordance with specifications including those associated with farm machineries • It includes two and four stroke compression ignition
Tooling and equipment	May include but are not limited to: • Hand tooling, • Meters, • Gauges, • Calibration, • Pressure testing devices , • Load testing devices and oil sample analysis equipment
Materials	May include but are not limited to: • Oils, lubricants , coolant ,spare parts • Cleaning materials
System variables	May include but are not limited to: • Radiators, thermostats, water pumps, hoses, fans, drive belts, heat exchanger, fans, and coolant heater manifold, oil cooler, muffler,

	catalytic converter, injection pump, fuel pump, oil pump, carburettor, filters, cooling system additives
Emergency procedures	May include but are not limited to: • Operating safely in the event of fires, enterprise first aid requirements and site evacuation
Environmental requirements	May include but are not limited to: • Waste management, noise, dust and clean-up management
Quality requirements	May include but are not limited to: • Regulations, including International standards • Internal organizational quality policies and procedures • Enterprise operations and procedures
Communications	May include but are not limited to: • Verbal and visual instructions and fault reporting and may include site specific instructions, written instructions, plans or instructions related to job/task, telephones and pagers
Organizational policies and procedures	May include but are not limited to: • Quality policies and procedures, including International standards • OHS, sustainability, environment, • Manufacturer specifications and industry codes of practice • Safe work procedures • Reporting and recording procedures

Evidence Guide	
Critical Aspects of Competence	Must demonstrate skills and knowledge in: • Apply safety procedures and requirements • Completing preparatory activity • Identify application, purpose and operating principles • Select methods and techniques appropriate to the circumstances • Conducting inspection and servicing of a range of engines in accordance with workplace and manufacturer/component supplier requirements and specifications • replace and adjust fuel system components • apply bleeding operation • Application of full repair/service sequence as per the range of emission control system • Dismantling, evaluating, assembling, adjustment, measuring and testing • repairing engine systems and associated components completed

Required knowledge and Attitude	Must demonstrate knowledge of: • OHS and environmental regulations/requirements, equipment, material and personal safety requirements • Operating principles of engines, lubrication, cooling and fuel systems and their relationship to each other • Types and layout of service/repair manuals • Inspection, repair and Service procedures • Turbocharger use and principle of operation • Selection, checking and use of tooling and equipment • Environment, relevant to inspection and servicing of applicable legislation, regulations, standards and codes of practice • organizational policies and procedures, including quality requirements, reporting and recording procedures, and work organisation and planning processes, related to inspection and servicing of engine systems • measuring and testing procedures
Required skills	Demonstrate skills to: • Establish safe and effective work processesto resolve problems and downtime, • Develop solutions to avoid or minimise reworking and avoid wastage • Apply engine system components replacement, service, repair and adjustment works • Apply workplace technology related to inspection and servicing of engines systems • Reporting/ documenting of results
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level II	
Unit Title	**Inspect and Service Steering System**
Unit Code	**AGR MEM2 04 0322**
Unit Descriptor	This unit covers the competence require to Prepare machinery for customer and/or storage, carry out steering system servicing and repair ,conduct steering system inspection works and prepare to undertake inspection and servicing

Elements	Performance Criteria
1. Prepare to undertake inspection and servicing	1.1 Nature and terminologies of work requirements are identified and confirmed. 1.2 Workplace ***information sources*** are accessed and procedures collected. 1.3 ***OHS requirements*** and Personal Protective Equipment needs are applied. 1.4 ***Tools, equipment*** and ***materials*** are sourced as required. 1.5 Methods appropriate for service are selected and prepared in accordance with standard ***safe operating procedures***. 1.6 Inspecting and servicing of ***steering systems*** and support equipment is identified and prepared. 1.7 Warnings are observed in relation to working with wheeled and tracked vehicles.
2. Conduct steering system inspection works	2.1 Inspection is implemented in accordance with workplace procedures and manufacturer/component supplier specifications. 2.2 Checking adjustments of steering systems and related components are carried out 2.3 Results are compared with manufacturer/component supplier specifications. 2.4 Results are documented with evidence and supporting information and recommendation(s) is made. 2.5 Report is forwarded to persons for action in accordance with workplace procedures.
3. Carry out steering system servicing and repair	3.1 Servicing is implemented in accordance with workplace procedures and manufacturer specifications. 3.2 ***Steering system*** of machineries are serviced and repaired according to service specifications 3.3 Adjustments, including wheeland linkages are made during the service 3.4 Steering ***system components*** are repaired and defective

	components replaced without damage 3.5 ***Emergency procedures*** are identified and followed as per organization's guideline.
4. Prepare machinery for customer and/or storage	4.1 Final check and inspection is made to ensure protective guards, safety features and cowlings are in place. 4.2 Machinery/equipment is cleaned for use or storage to workplace expectations. 4.3 Performances are recorded and Service schedule documentation is completed.

Variable	**Range**
Information sources	May include but are not limited to: • Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches • Safe work procedures related to the inspection and servicing of Agricultural machinery steering systems and associated components • Regulatory/legislative requirements pertaining to the agricultural machinery, including international design rules • Organisation work specifications and requirements • Instructions issued by authorised enterprise or external persons • International standards
OHS requirements	Are to be in accordance with legislation/ regulations/codes of practice and enterprise safety policies and procedures. This may include: • Protective clothing and equipment • Workplace environment and safety • Handling of material • Use of fire fighting equipment • Enterprise first aid • Hazard control and hazardous materials and substances
Tooling and equipment	May include but are not limited to: • Hand tools, • Measuring tools • Hydraulic pressure gage • Hydraulic crane • Floor jacks • Safety stands
Materials	May include but not limited to: • Lubricants and cleaning materials
Safe operating procedures	May include but are not limited to: • The conduct of operational risk assessment and treatments associated with: ➢ Vehicular movement ➢ Hazardous substances ➢ Electrical safety ➢ Equipment movement and operation

	➢ Manual lifting and shifting ➢ Working in proximity to others and site visitors
Steering systems	May be in: • Wheeled and tracked vehicles • Heavy machinery and outdoor power equipment • Articulated machineries
Emergency procedures	May include but are not limited to: • Emergency shutdown and stopping of equipment • Operating safely in the event of fires • Enterprise first aid requirements and site evacuation
Environmental requirements	Are to include but are not limited to waste management, noise, dust and clean-up management
Communicating	Are to include but are not limited to: • Verbal and visual instructions and fault reporting and may include: ➢ Site specific instructions ➢ Written instructions ➢ Plans or instructions related to job/task ➢ Telephones and pagers
System components	For inspection may include but not limited to: • Wheel bearings, ball joints • Cross joints, struts • Idler arms, pitman arm • Steering pump • Steering boxes and columns • Electronic controlled systems • Two and four wheel steering and full hydraulic steering, including articulated vehicles and tracked type systems

Evidence guide	
Critical aspects of competence	Must demonstrate skills and knowledge in: • Applying safety procedures and requirements • Selecting methods and techniques appropriate to the service • Conducting inspection and service of steering systems in accordance with manufacturer requirements • Perform steering system adjustments based on specification • Inspection, servicing, repairing and adjustments are completed within workplace timeframe and without damage
Required knowledge and attitudes	Demonstrate knowledge of: • OHS and environmental regulations/requirements, equipment, material and personal safety requirements • Operating principles of mechanical, hydraulicsteering and articulated systems and their relationship to each other • Types and layout of service/repair systems • Inspection procedures • Service procedures • Adjustment procedures and methods • Maintenance quality procedures

Required skills	Demonstrate skills of: • Interpret and apply manufacturer procedures, workplace policies and procedures • Establish safe work procedures to resolve problems and downtime • Develop solutions to avoid or minimize reworking and avoid wastage • Apply inspection, servicing, repairand replacement of steering systems and associated components • The reporting/documenting of results
Resources implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Methods of assessment	Competency may be assessed through: • Interview / written test • Observation / demonstration with oral questioning
Context of assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level II	
Unit Title	**Inspect and Service Suspension System**
Unit Code	**AGR MEM2 05 0322**
Unit Descriptor	This unit competence covers the knowledge ,attitude and skill required to identification and confirmation of work requirement, preparation for work, inspection, analysis and servicing of suspension systems and completion of work finalisation processes, including clean-up and documentation.

Elements	**Performance Criteria**
1. Prepare to inspect and service suspension systems	1.1 Workplace **information sources** are accessed 1.2 ***OHS requirements*** and Personal Protective Equipment needs are implemented. 1.3 Workshop manuals and specifications, and tooling required are

	sourced. 1.4 Servicing equipment's are selected and prepared in accordance with standard ***safe operating procedures***. 1.5 Resources required for servicing ***suspension systems*** are sourced and support ***equipment, tool*** and ***materials*** are identified and prepared. 1.6 Warnings in relation to working with wheeled and/or tracked equipment are observed.
2. Conduct suspension system inspection works	2.1 Inspection is implemented in accordance with manufacturer specifications. 2.2 Inspection results are compared with manufacturer specifications to indicate compliance or non-compliance. 2.3 Results are documented with evidence and supporting information and recommendation(s) made. 2.4 Report is forwarded to persons for action in accordance with workplace procedures.
3. Carry out suspension system service and repair works	3.1 Service is implemented in accordance with workplace procedures. 3.2 Defective components are repaired and replaced 3.3 Adjustments are made during the service in accordance with manufacturer specifications. 3.4 Service, repair and adjustments are implemented without damage 3.5 Final work implemented is reported and documented
4. Complete suspension system servicing	4.1 Component assembly is completed 4.2 Final inspection is made to ensure protective guards, safety features and cowlings are in place. 4.3 Final inspection is made to ensure work is to workplace expectations. 4.4 Service schedule documentation is completed. 4.5 Job card is processed in accordance with workplace procedures.

Variable	**Range**
Information/ Documents sources	May include but are not limited to: • Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches • Safe work procedures related to the inspection and servicing of suspension systems • Regulatory/legislative requirements pertaining to the automotive industry, including International Design Rules • Engineer's design specifications and instructions • Organisation work specifications and requirements • Instructions issued by authorised enterprise or external persons

	• International Standards
OHS requirements	Are to be in accordance with legislation/regulations/codes of practice and enterprise safety policies and procedures. This may include: • Protective clothing and equipment, • Use of tooling and equipment, • Workplace environment and safety, • Handling of material, • Use of fire fighting equipment, • Enterprise first aid, • Hazard control and hazardous materials and substances
Suspension systems	May include but not limited to: • hydraulic, pneumatic • Mechanical and rubber suspension found on heavy vehicles, • Trailers and outdoor power equipment
Systems	May include but not limited to: • Lateral and longitudinal arms • Independent suspension • Springs and damper • Front and rear • Self-levelling device, ride control • Height control and tracked type systems
Tooling and equipment	May include but not limited to: • Hand tooling, • Lifting equipment • Safety stands and supporting equipment • Measuring equipment • Power tooling • Testing equipment
Materials	May include but not limited to: • Spare parts, • Lubricants and fluids and cleaning materials
Safe operating procedures	May include but not limited to: • The conduct of operational risk assessment and treatments associated with vehicular movement, hazardous substances, equipment movement and operation, manual lifting and shifting, working in proximity to others and site visitors
Quality requirements	May include but not limited to: • Regulations, including International Standards, internal company quality policy and standards and enterprise operations and procedures
Communications	May include but not limited to: • Verbal and visual instructions and fault reporting and may include site specific instructions, written instructions, plans or instructions related to job/task, telephones and pagers

Evidence guide	
Critical aspects of competence	Must demonstrate skills and knowledge competence in: • Applying safety procedures and requirements • Selecting methods and techniques appropriate to the circumstances • Conducting the inspection and servicing of suspension systems in accordance with manufacturer requirements • Accurately interpreting test results • Completing service of suspension system and associated components within workplace timeframes
Required knowledge and attitudes	Demonstrate knowledge of: • OHS regulations/requirements, equipment, material and personal safety requirements • Operating principles of suspension systems relevant to the qualification to which it is applied • Type and components of suspension system identified • Types of service/repair manuals (hard copy and electronic) • Suspension system servicing procedures • Suspension system testing procedures • Service quality procedure
Required skills	Demonstrate knowledge to: • Establish safe work processes to resolve problems and downtime, • Develop solutions to avoid or minimise reworking and avoid wastage • Apply accurate measurements, calculate material requirements and establish quality checks • Apply the inspection and service of suspension systems, • Reporting/documenting of results and diagnostic and specialised tooling and equipment
Resources implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Methods of assessment	Competency may be assessed through: • Interview / written test • Observation / demonstration with oral questioning
Context of assessment	Competency may be assessed in the work place or in a simulated work place setting

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level II	
Unit Title	**Inspect, Service and Repair Braking Systems**
Unit Code	**AGR MEM2 06 0322**
Unit Descriptor	This unit competence knowledge , attitude and skill the required to, preparation for work, inspection, analysis and servicing of braking systems and completion of work finalisation processes, including clean-up and documentation.

Elements	Performance Criteria
1. Prepare to undertake inspection of braking systems	1.1 Workplace information sources procedures are identified. 1.2 ***OHS requirements*** and ***personal protective equipment*** needs are applied throughout the work. 1.3 Procedures and ***information*** are sourced such as workshop manuals and specifications as required. 1.4 Method options are analyzed, selected and prepared to the circumstances. 1.5 Relevant tools, equipment and materials requirements are identified 1.6 Technical and/or adjustment requirements for the inspection of air braking systems are applied. 1.7 Support equipment is identified and prepared. 1.8 Warnings in relation to working with air braking systems are observed.
2. Conduct inspection and analyse results	2.1 Methods for the inspection are implemented 2.2 Inspection results are compared with manufacturer specifications to indicate compliance or non-compliance. 2.3 Results are documented with evidence and supporting information and recommendation(s) is/are made. 2.4 Report is processed in accordance with workplace procedures.
3. Servicing braking system	3.1 Methods for the servicing are implemented. 3.2 Environmental requirements are observed and precautions implemented. 3.3 ***Safe operating procedures*** are applied and noted during the use of tools/ equipment in accordance with workplace guidelines. 3.4 Service and repair adjustments are applied. 3.5 Air brake and hydraulic brakes services are applied 3.6 Hand brake is adjusted and maintained 3.7 Final Brake service works are tested
4. Complete service operations	4.1 Final inspection is made to ensure work is to workplace expectations. 4.2 Service schedule documentation is completed and ***communicated*** to appropriate personnel. 4.3 Equipment is cleaned for use or storage to workplace expectations. 4.4 Job card is processed in accordance with workplace procedures.

Variable	Range
OHS **requirements**	May include but not limited to: • Protective clothing and equipment, • Use of tooling and equipment, • Workplace environment and safety, • Handling of material, • Use of fire fighting equipment, • Enterprise first aid, • Hazard control and hazardous materials and substances
Personal protective equipment	May include but not limited to: • Gloves • Protective eyewear • Apron/overall • Safety shoes…
Information	May include but are not limited to: • Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches • Safe work procedures related to the inspection, analysis and servicing of air braking systems • Regulatory/legislative requirements pertaining to the automotive industry, including International Design Rules • Engineer's design specifications and instructions • Organisation work specifications and requirements • Instructions issued by authorised enterprise or external persons • International Standards
Tools and equipment	May include but are not limited to:- • Hand tooling • Specialist tooling • Meters • Gauges • Brake testing devices load testing devices • Brake drum diameter verniercaliper
Materials	May include but are not limited to: • Fluids, • Minor parts, • Spare parts • Filters and cleaning materials
Workplace procedures	May include but are not limited to: • The conduct of operational risk assessment and treatments associated with vehicular movement, toxic substances, electrical safety, equipment movement and operation, manual and mechanical lifting and shifting, working in proximity to others and site visitors • Emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation

Component	May include but not limited to: • Compressors • Pressure regulator • Four way protection valve • Air tanker and tubes • Load sensing valve • Break chamber/wheel cylinder • Relay valve • Receivers • Actuator mechanisms • Brake booster • Brake retarders • Fluid reservoir and master cylinder • Brake discs
Requirements	May include but are not limited to: • Waste management, noise, dust and clean-up management: • Regulations, including International Standards, internal company quality policy and standards and enterprise operations and procedures
Emergency procedures	May include but are not limited to: • Emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation
Environmental requirements	May include but are not limited to: • Waste management, noise, dust and clean-up management
Safe operating procedures	May include but are not limited to: • Operational risk assessment and treatments associated with vehicular movement • Toxic substances • Electrical safety • Equipment movement and operation • Manual and mechanical lifting and shifting • Working in proximity to others and site visitors
Quality requirements	May include but are not limited to: • Regulations, including International standards, internal company quality policy and standards and enterprise operations and procedures
Communicating	May include but are not limited to: • Verbal and visual instructions and fault reporting and may include: ➢ Site specific instructions ➢ Written instructions ➢ Plans or instructions related to job/task ➢ Telephones and pagers

Evidence guide	
Critical aspects of competence	Must demonstrate skills and knowledge competence in: • Applying safety procedures and requirements • Selecting methods and techniques appropriate to the circumstances

	• Interpreting inspection results • Conducting the service in accordance with manufacturer requirements • Applying service of air braking, hydraulic braking systems and hand brake components within workplace timeframes • Complete service activity in compliance with workplace requirements
Required knowledge and attitudes	Demonstrate knowledge of: • OHS and environmental regulations/requirements, equipment, material and personal safety requirements • Dangers of working with air brakes • Operating principles and types of air and hydraulic braking systems and components and their relationship to each other • Inspection procedures • Types and layout of service/repair manuals • Servicing procedures • Service quality procedures
Required skills	Demonstrate skills to: • Apply inspection and service hydraulic brakes • Apply inspection, analysis and servicing of air braking systems • Perform hand brake adjustment and service • develop solutions to avoid or minimise reworking and avoid wastage • The reporting/documenting of results
Resources implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Methods of assessment	Competency may be assessed through: • Interview / written test • Observation / demonstration with oral questioning
Context of assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational standard: Agricultural Machinery and Equipment Maintenance Level II	
Unit Title	**Test and Repair Electrical/Electronic Units/Assemblies and Low Voltage accessories**
Unit Code	**AGR MEM2 07 0322**
Unit Descriptor	This unit competence knowledge, attitude and skill require to preparation for work, removal and replacement of electrical and electronic units/assemblies, completion of work finalisation processes, and clean-up and documentation.

Elements	Performance Criteria
1. Prepare for work	1.1 Work instructions and ***information*** are used to determine job requirements, including method, material and equipment. 1.2 Manuals and specifications and schematic drawings are read and interpreted. 1.3 ***OHS requirements***, ***Personal Protection Equipment (PPE)*** needs are applied throughout the work. 1.4 ***Material*** appropriate to application for work is selected and prepared. 1.5 ***Equipment and tools*** are identified and checked for safe and effective operation. 1.6 ***Safe operating procedures*** are determined to minimise waste material. 1.7 Procedures are implemented for maximising efficiency while completing the job.
2. Remove electrical/ electronic units/ assemblies	2.1 Correct information is accessed and interpreted from manufacturer specifications. 2.2 ***Electrical/electronic units/assemblies*** are removed using approved methods, tools and equipment. 2.3 Removal is completed without causing damage to component or system. . 2.4 Units/assemblies are handled and stored in accordance with manufacturer procedures.
3. Repair and replace electrical/ electronic units	3.1 Electrical units/assemblies are inspected, and tested using proper methods, tools and equipment. 3.2 Repair and Replacement is completed according to the procedure without causing damage to component or system. 3.3 Workplace documents are completed in accordance with site requirements. 3.4 Testing is completed without causing damage to component or system. 3.5 Test results are registered and documented 3.6 Wiring/lighting circuit installation procedures are implemented according to the manufacturer specification and the required schematic drawing

4. Clean up work area and maintain equipment	4.1 Material that can be reused is collected and stored. 4.2 Waste and scrap are removed by following workplace and environmental procedures. 4.3 Equipment and work area are cleaned and inspected for serviceable condition in accordance with workplace procedures. 4.4 Unserviceable equipment is tagged and stored in accordance with ***environmental requirements***. 4.5 Maintenance is completed report and documentation is organised.

Variable	**Range**
Information	May include but not limited to: • Verbal and/or written compliant report. • Verbal or written and graphical instructions, , work schedules/plans/specifications, • Work bulletins, memos, material safety data sheets, schematic drawings or sketches • Safe work procedures related to installation and repair of machineries and trailer wiring/lighting systems • International Design Rules, engineer's design specifications and instructions. • International standards
OHS requirements	May include but not limited to: Legislation/regulations/codes of practice and enterprise safety policies and procedures, and may include: • Protective clothing and equipment, • Use of tools and equipment, • Workplace environment and safety rules and regulations. • Handling of material, use of fire fighting equipment and first aid kit
Personal Protection Equipment (PPE)	May include but not limited to: • That prescribed under legislation/regulations/codes of practice and workplace policies and practices
Material	May include but not limited to: • Wires, cleaning agents, insulation tapes, masking tapes, wire cutter
Equipment and tooling	May include but not limited to: • Hand tools, • Power tools, • Testing equipment, • Measuring tools.
Safe operating procedures	May include but are not limited to: • The conduct of operational risk assessment and treatments associated with machineries movement, • Toxic substances, electrical safety, equipment movement and operation, manual and mechanical lifting and shifting, working with others and site visitors • Emergency shutdown and stopping of equipment, fire extinguishers, enterprise first aid requirements and site evacuation strategies.
Electrical/electronic	May include but not limited to:

units/assemblies	• Headlights, • Tail-lights, • Turn signal • Stop light and • Solenoids, actuators, sensors…
Critical precautions	May include but not limited to: • Manufacturer/component supplier notifications and procedural attentions which must be applied on poor working practices that are likely damage electronic system ecusand/or other components
Enterprise policies and procedures	May include but not limited to: • National policies and procedures, including relevant standards. • Manufacturer specifications and industry codes of practice • Safe work procedures • Reporting and recording procedures
Environmental requirements	May include but are not limited to: • Waste management, noise, dust and clean-up management • Regulations, including Ethiopian standards, internal company quality policy and standards and enterprise operations and procedures

Evidence Guide	
Critical Aspects of Competence	Must demonstrate skills and knowledge competence in: • apply safety procedures and requirements • communicating effectively with others involved in or affected by the work • Proper selection of methods and techniques to the requirement implemented. • removing and replacing electrical assemblies to workplace and manufacturer/component supplier requirements, • Reading and interpreting low voltage wiring diagrams • repairing and Installing low voltage wiring/lighting to specification • Testing low voltage wiring/lighting to determine short, open and earthing faults • completing final functionality test and comparing to specification • collecting, storing and handling units/assemblies
Required knowledge and attitude	Demonstrate knowledge of: • OHS regulations/requirements, equipment, material and personal safety requirements • types, applications and external specifications of electrical/electronic units/assemblies • removal and replacement procedures for electrical/electronic units/assemblies • Low voltage theory for agricultural machineries application. • Precautions to avoid side effects that could occur during systems installation, testing and repair operations • Operation of low voltage electrical wiring/lighting circuits and components relevant to the application • Wiring and lighting installation, testing and fault finding procedures • Working knowledge of site reporting procedures

	• State lighting regulations and International Rules.
Required skills	Demonstrate skills to: • collect, organise and understand information related to work orders, and safety procedures for removing , replacing electrical/electronic units/assemblies and installation, testing and repairing wiring and lighting systems • interpretation of technical information and specifications related to low voltage wiring/lighting systems • applySafe working practices of low voltage wiring/lighting systems. • work with others and in a team cooperative approaches to optimise workflow and productivity • apply pre-checking and inspection techniques to avoid wastage of time and material • perform low voltage wiring/lighting system installation, testing and repair functions • Problem-solving skills for a limited range of procedural issues • apply removal and replacement of electrical and electronic units/assemblies, installation and repair of vehicle and trailer wiring/lighting systems. • the reporting/documenting of results
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test • Observation / Demonstration/with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Farm Machinery and Equipment Maintenance Level II	
Unit Title	**Service and Repair Agricultural Implements & Trailers**
Unit Code	**AGR MEM2 08 0322**
Unit Descriptor	This unit of competence covers the knowledge, attitude and skills to prepare service and repair of agricultural implements and trailers, Test, service, and repair implements, Adjust implements and trailer, Check and Verify system operation, Clean-up work area and maintain equipment.

Elements	Performance Criteria
1. Prepare for work	1.1 ***Occupational Health and Safety (OHS)***of workplace and environmental procedures and practices are identified to the work. 1.2 Service procedures and relevant workshop manuals and manufacturer ***information*** are used. 1.3 Regulations and requirements are accessed and interpreted. 1.4 ***Tools, equipment*** and ***materials*** are checked and prepared. 1.5 Service and/or repair method are decided in accordance with ohs, environmental and industry regulations, guidelines, and enterprise procedures. 1.6 Work area is selected and set up.
2. Test, service, and repair implements	2.1 Appropriate diagnostic test is selected and used. 2.2 Testing of trailer and ***implements*** are undertaken. 2.3 Test results are compared with specifications and job requirement. 2.4 Testing ***servicing, repairing and/or maintenance*** are carried out using methods, equipment and tolerances suitable to the implementation and trailer application. 2.5 Manufacturer specifications, OHS, and workplace environmental and sustainable procedures and practices are implemented.
3. Adjust implements and trailer	3.1 ***Trailer***, ***implements*** and ***axles*** applications are identified. 3.2 Implement adjustment is applied using the proper measurement procedure. 3.3 Methods, equipment and tolerances suitable to the trailer application are used in accordance with manufacturer specifications. 3.4 Adjustment is carried out in accordance with manufacturer specifications and work standards 3.5 OHS and workplace environmental procedures and practices are implemented.

4. Check and Verify system operation	4.1 Physical inspection and noise tests are undertaken. 4.2 Operational/ functional tests are performed. 4.3 Implements and trailers test results is checked and approved.
5. Clean up work area and maintain equipment	5.1 Equipment and tools are cleaned and inspected according to workplace requirements. 5.2 Unserviceable equipment and faults identified are tagged in accordance with workplace requirements. 5.3 Work completion documentation, are finalized. 5.4 Work area is cleaned; wastes and scraps are isolated for disposal. 5.5 Re-useable material, tools and equipment are stored in accordance with workplace procedures.

Variable	**Range**
Occupational Health and Safety (OHS)	Are to be in accordance with applicable legislation and regulations, and organizational safety policies and procedures, and may include: • Personal protective equipment and clothing • Safety equipment • First aid equipment • Hazard and risk control • Elimination of hazardous materials and substances • Manual handling, including shifting, lifting and carrying • Emergency procedures • Road rules • Safe driving policy
Information	May include but not limited to: • Verbal, written and graphical instructions issued by authorized internal and external persons • Parts listing prices and catalogues • Inventory systems • Repair Times Manuals • Material Safety Data Sheet (MSDS) • Manufacturer specifications • Industry standards • Workplace specifications and requirements
Tools and equipment	May include but not limited to: • Hand tools • Power tools • Air tools • Special tools and equipment • Lubricating equipment • Measuring equipment • Vacuum gauges • Manufacturer special tools • Lifting equipment • Sledge hammer
Materials	May include but not limited to: • Lubricants

	• Fluids • Containers • Cleaning materials
Trailers	May include but not limited to: • trailed • Semi-trailed • Dumper/tipping and non tipping trailers
Implements	May include but not limited to: • Load carrier trailers • Semi-mounted agricultural implement. • Mounted agricultural implement • Trailed agricultural implement • Tillage implements (primary and secondary tillage plough) • Seedier/Planter/transplanter/spreader • Cultivators • Fertilizer applicator • Mowers, • Balers, • Silage making machines • Feed choppers • Hay making machines
Axles	May include but not limited to: • Different types of wheel axles • Trailed axles
Servicing**,** repair and/or maintaining	May include but not limited to: • Cleaning • Greasing and lubricating mating parts • Reconditioning and improving • Measuring , adjusting and checking • Calibrating and correcting • Operational testing • Replacement of components
Verify system	May include but not limited to: • Check and approve testing result and functionality/ operational readiness.

Evidence guide	
Critical aspects of competence	Must demonstrate skills and knowledge in: • Observe safety procedures and requirements • Communicate effectively with others involved in or affected by the work • Select servicing and repair methods and techniques appropriate to the circumstances implements and trailer types • Complete preparatory activity in a systematic manner • Service, repair and replace implements and trailers to job and supplier requirements

	• Complete workplace and equipment records and workplace clean-up requirements
Required knowledge and attitudes	Demonstrate knowledge of: • Types of implements and load carrying trailers • Operating principles and their relationship to machinery operation systems. • Inspection and repair procedures applicable to the implement and trailer type and including , coupling, frames, hoses, fittings and adjustments • Service and repair manuals of manufacturer and component supplier specifications, • Organizational policies and procedures of reporting and recording procedures, related to servicing and repairing of implements and trailers with their components
Required skills	Demonstrate skills to: • Technical skills to the level required to adjust, service and repair, for the testing, reporting and recording of results • Communication skills to the level required to confirm work requirements and specifications, • Skills to the level required to understand information related to work orders, • Interpret technical information and specifications, and complete workplace documents • Team skills to the level required to work effectively and cooperatively with others to optimise workflow and production
Resources implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Methods of assessment	Competency may be accessed through: • Interview / written test • Observation / demonstration with oral questioning
Context of assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level II	
Unit Title	**Perform Periodic Service**
Unit Code	**AGR MEM2 09 0322**
Unit Descriptor	This unit covers competence to carry out periodic service and scheduled maintenance work according to manufacturer specifications, design standards and customer requirements.

Elements	Performance Criteria
1. Prepare for work	1.1 ***Periodic service and Maintenance work plan*** is checked and compared. 1.2 ***Inspection*** of machine operation systems and components, which present a special risk, are identified. 1.3 ***Resource of Information*** are selected by maintenance data, technical documents and service plans 1.4 Data is collected and inspection equipment, tools are prepared for use. 1.5 Machinery is cleaned and parked on a level ground and comfortable working place for servicing. 1.6 Inspection check lists are prepared and arranged for data collection.
2. Carry-out service and Maintenance activities	2.1 Systems and functional units are inspected physically and using technical procedures according to manufacturer recommendations. 2.2 Service tools equipment and required materials are implemented in accordance with the proper service time procedure. 2.3 Service kits and spare parts are selected and replaced to the required system component referring maintenance schedules procedure. 2.4 Lubricants are replaced with proper handling procedure. 2.5 Used oil is disposed with regular environmental and national rules and regulations. 2.6 Service rules, standards and regulations for securing the machine lifetime are implemented.
3.Completing periodic service operation	3.1 .tools and equipment are cleaned with the working environment requirement. 3.2 .Record and documentation is performed by analysing the checklist data collected 3.3 . Results and findings are recorded in machinery history jacket 3.4 Handing over vehicle to customer is carried out

Variables	Range
Work plan	May Include but not limited to: • Manufacturers' documentation of service concepts.

	• company maintenance procedure • Repair guides and service plans 'Standard/special tools • Technical systems for Maintenance • Technical information, Procedures and devices. • Health and safety at work and prevention of accidents
Performing inspection	May Include but not limited to • Visual and physical inspection, • Noise test, • Checking loosen and worn parts, • Walk around inspection. • Leakage inspection, • Checking functionality; • Checking and measuring tyre inflation. • Electrical system inspection. • Machine controlling units check…
Periodic service	May include but not limited to: • Service and replace with time schedule of recommended maintenance manual • 5ohr • 1000hr • 5000hr
Periodic service and Maintenance	May Include but not limited to • Change oil and filters • Check and adjust belt tension • Check and adjust brake system • Service and check wheels and related components • Check and maintain electrical systems
Resource of information	May Include but not limited to : • Machinery history jacket. • Types of service fluids, lubricants, service kits • Periodic Maintenance manual • Manufacturer Service Manual, • technical information system /workshop information system • communications and documentation systems • Risk factor (high-voltage systems, pyrotechnic systems, hazardous, explosive, highly pressurized fluids

Evidence guide	
Critical aspects of competence	Demonstrates skills and knowledge to: • Determine the scope of work and carrying out the service and maintenance work • Identify assemblies and components, which give particular risks • Inspect differentiate systems, subsystems and functional

	units and describe their interaction • Evaluate fault memory, maintenance data, technical documents and service plans to obtain information and documentation • Implement the rules, norms and procedures forming the basis of the service • Develop awareness of safety and apply regulations relating to health and safety at work and protection of the environment in a secure way.
Required knowledge and attitudes	Demonstrate knowledge of: • Technical systems • Use of manuals and interpreting specifications • Function of systems and subsystems • Service tools and equipment application • Health and safety standards • Types of lubricant for different machinery system applications • Periodic service need and maintenance requirement
Required skills	Demonstrate skills of: • Periodic service operation. • Cleaning, arranging machinery location for service. • Draining lubricants and working fluid medias. • Replacing service kits according to the schedule requirement • Disposing and recycling • Using workshop information system • Recognizing tear and wear • Recording and data documentation.
Resource implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Methods of assessment	Competence may be assessed with: • Interview / written test • Observation / demonstration with oral questioning
Context of assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance II	
Unit Title	**Perform Wheel Alignment and Balance**
Unit Code	**AGR MEM2 10 0322**
Unit Descriptor	The unit includes identification and confirmation of work requirement, preparation for work, carrying out wheel alignment operations and completion of work finalisation processes, including clean-up and documentation

Elements	Performance Criteria
1. Carry out wheel alignment pre-checks	1.1 Procedures and information such as workshop manuals and specifications interpretation and required tools, are selected checked and applied. 1.2 ***Machineries /equipment ,tests and checks*** are performed to confirm need for alignment 1.3 Farm machinery ***wheel alignment pre-checks*** are ***carried out*** in accordance with manufacturer manual instruction.
2. Perform farm machinery wheel alignment	2.1 Correct information is accessed and interpreted from manufacturer specifications. 2.2 Machinery is located on proper place for wheel alignment operation. 2.3 ***Wheel alignment measuring equipment*** is connected to farm machinery in accordance with manufacturer specifications. 2.4 Corrective adjustments/repairs are carried out in accordance with manufacturer specifications 2.5 Wheel alignment is completed without causing damage to any component or system 2.6 Workplace documentation and result notification is completed that is relevant to alignment outcomes
3. Complete documentation	3.1 Service history is updated in accordance with workplace requirements 3.2 Before and after alignment measurements are documented and included in customer documentation 3.3 Job card is processed in accordance with workplace procedures
4. Clean up work area and maintain equipment	4.1 Equipment and work area are cleaned and inspected for serviceable condition in accordance with workplace procedures 4.2 Tools and equipment are returned in accordance with workplace procedures

Variables	Range
Machinery equipment tests	May include but not limited to: • Check condition of suspension • Check condition of wheel balance • Parts wear and Corrosion • Excessive clearance, • Improper fittings and adjustments.
Wheel alignment pre-checks	May include but not limited to: • Farm machinery horizontal position on rotary and sliding plates • Checking tire pressure • Loading condition • Correct tire and rim size • Tie rod • camber, caster, steering axis inclination and toe out/in
Wheel alignment measuring equipment	May include but not limited to: • Measuring rod, meter. • wheel balancer • automatic wheel alignment machine • wheel disc
Quality standards	May include but not limited to: • Company used documentation procedure • Maintenance of tools and devices

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge to: • Observing safety procedures and requirements • Communicating effectively with others involved in or affected by the work • Equipment and materials Selecting methods and techniques appropriate to the intended operation. • Completing preparatory activity and machine arrangement. • Conducting the alignment of a range of wheels in accordance with workplace and manufacturer manual instruction • adjust camber, caster, king pin inclination, tie rod and toe out/in • Accurately interpreting wheel alignment measurements • Completing wheel alignment within workplace timeframes
Required Knowledge and Attitudes	Demonstrate knowledge of: • OHS regulations/requirements, equipment, material and personal safety requirements • wheel alignment working principles • Condition of tie rod and work principle • Relationships between fault symptoms and component defects

	• Wheel alignment application system and types with their construction • Operational requirement and purpose of wheel alignment
Required Skills	Demonstrate skills of: • Communication skill • Wheel alignment procedure • Tear and wear identification of suspension • Operating principles of steering geometry and wheel alignment • adjust camber, caster, king pin inclination, tie rod and toe out/in • application of alignment measuring tools and testing equipment
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed with: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level II	
Unit Title	**Repair and Service Livestock Machinery and Equipment**
Unit Code	**AGR MEM2 11 0322**
Unit Descriptor	This unit of competency covers the knowledge, skills and attitudes required, Prepare for Service and repair work, carry out servicing and repairing and complete servicing

Elements	**Performance Criteria**
1. Prepare for Service and repair work	1.1 Nature and scope of livestock products are identified and confirmed. 1.2 **OHS requirements** and **personal protection equipment** needs are applied throughout the work. 1.3 .**Safe operating procedures** and **information** such as site procedures and specifications, and tooling are implemented. 1.4 Requirements of the service and repair work responsibilities clarified. 1.5 **Machineries and Equipment** needs servicing and repairing are identified according to the scope of the coordination work and

	supervisor instructions 1.6 Workplace hazards, assess risks and implement risk controls are identified.
2. Carry out servicing and repairing	2.1 Methods for the servicing and repairing of ***machine components*** are implemented 2.2 Procedures and information required are identified and applied. 2.3 Technical and tool requirements for servicing and repairing are identified and support equipment prepared. 2.4 Service and repair adjustments are applied 2.5 Repaired machines and equipment are tested 2.6 Service and repair activities are documented and reported.
3. Complete servicing	3.1 Inspect, service and repair schedule documentation is completed and communicated to appropriate personnel. 3.2 Final inspection is made to ensure work is to workplace expectations. 3.3 Equipment is cleaned for use or storage to workplace expectations. 3.4 Job card is processed in accordance with workplace procedures.

Variable	**Range**
OHS requirements	May include but not limited to: • Protective clothing and equipment, • Workplace environment and safety, • Handling of material, • Use of fire-fighting equipment, • first aid, • Hazard control and hazardous materials and substances
Personal protection equipment	May include but not limited to: • Gloves • Protective eyewear • Apron/overall • Safety shoes…
Safe operating procedures	May include but are not limited to: ❖ operational risk assessment and treatments associated With machine movement o toxic substances o electrical safety o equipment movement and operation o manual and mechanical lifting and shifting o working in proximity to others and site visitors
Information	May include but are not limited to: • Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches • Safe work procedures related to the inspection, analysis and servicing of livestock machinery and equipment

	• Regulatory/legislative requirements pertaining to the industry, including International Design Rules • Machine design specifications and instructions • Organisation work specifications and requirements • Instructions issued by authorised enterprise or external persons • International Standards
Machinery and equipment	May include but not limited to: Machinery and equipment used for Livestock, poultry and bees production product processing and handling • Miller, mixer, grinder, pellet • Cold storage • Fish processing equipment • Milking machine • Churning machine • Cream separator • Hatchery and setter • Honey extractor • Incubator • Milk tester
machine component	For inspection and service may include but not limited to: • Cutting mechanism, • Feeding mechanism, • Chopping • Slicing and peeling mechanism. • Preservation mechanism • Transport and handling mechanism • Baling mechanism, • Drying, • Extraction, separation

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills competence to: • applying safety procedures and requirements • Communicating effectively with others. • Selecting methods and techniques appropriate forservicing. • Completing preparatory activity in a systematic manner • Accurately interpreting inspection results • Conducting inspection, repair and service in accordance with workplace and manufacturer repair manual instruction • Completing service of livestock machinery/equipment within workplace timeframes • Machinery/Equipment is presented to customer in compliance with workplace requirements
Required Knowledge and Attitudes	Demonstrate knowledge of: • OHS and environmental regulations/requirements, equipment, Material and personal safety requirements • Dangers of working with livestock machineries • Types of livestock machine and equipment • Operating principles of each machinery/equipment and

	components and their relationship to each other • Inspection procedures • Types and layout of service/repair manuals • Servicing procedures • Repairing procedures • Enterprise quality procedures
Required Skills	Demonstrate skills to: • Apply analytical skills required for identification and analysis of technical information • Establish safe and effective work processes which anticipate and/or resolve problems and downtime. • Develop solutions to avoid or minimise reworking and avoid wastage • Inspection, Servicing repairing and adjustments are implemented. • Apply workplace technology related to servicing tooling and equipment, inspection, analysis and servicing of machinery. • Reporting/documenting of results
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with OralQuestioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance L-II	
Unit Title	**Perform body repair and paints**
Unit Code	**AGR MEM212 0322**
Unit Descriptor	This unit of competency covers the skills and knowledge required to perform body repair and paint of agricultural machineries, and it is required body correction, using body tools, preparing body for painting, removing paint, applying primary paint and final paint for finishing operation.

Element	Performance Criteria
1. Prepare for work	1.1. Work instructions are used to determine job requirements, including method and material type. 1.2. Job specifications are read and interpreted. 1.3. ***Workplace Health and Safety (WHS)*** requirements, including personal protection needs, are implemented throughout the work. 1.4. Materials are selected, inspected and prepared for work. 1.5. Body work tools, power tools, and safety equipment are checked and prepared for operation. 1.6. Working area of body repair and paint is selected and arranged according to the required work procedure. 1.7. Procedures are determined to minimize waste material. 1.8. Procedures are identified for maximizing efficiency
2. Perform body repair	2.1 Proper body repair Tools and equipment are used according to the work requirement. 2.2 Damaged body part is repaired depending on the work depth 2.3 Repaired body part is checked for surface finishing. 2.4 Tools and equipment are collected; working area is cleaned in accordance with work place procedure.
3. Prepare for painting operation	3.1 Information is accessed and interpreted from manufacturer/ component supplier specifications. 3.2 Preparation is carried out according to work shop regulations/guidelines, WHS requirements, legislation and enterprise procedures/policies. 3.3 Tools, equipment and/or materials are selected according to the required job. 3.4 Protective clothing and equipment are used during all stages of the removal process. 3.5 Former paint removal is applied using grinder, scraper, sand paper and other detergent or cleaning fluids. 3.6 Remove and fix rust spots.
4. Perform primary	4.1 Paint type selection and mixing the required paint is

painting operation.	applied according to the operation sequence and procedure. 4.2 Cover glasses and other body parts that are not intended for painting with protecting papers and masking tape. 4.3 Apply primary painting using the proper method of application with the spray gun. 4.4 Primary painting is carried out according to industry regulations/guidelines
5. Apply final painting	5.1. Select the final paint color recommended for the machine according to the specification and job requirement. , 5.2. Special treatments and/or materials are applied as per manufacturer/component supplier recommendations. 5.3. Final painting is completed without causing damage to component or system. 5.7. Final inspection and documentation is carried out.
6. Clean up work area and maintain equipment	6.1 ***Material*** that can be reused is collected and stored. 6.2 Waste and scrap is removed following workplace procedure. 6.3 Equipment and work area are cleaned and inspected for serviceable condition in accordance with workplace procedures. 6.4 Unserviceable equipment is tagged and faults identified in accordance with workplace procedures. 6.5 Painting operation is completed in accordance with manufacturer/worksite procedures. 6.6 ***Tools*** are maintained in accordance with workplace procedures.

Variables	**Range**
WHS	May include but not limited to: • Protective clothing and equipment • Use of tooling and equipment • Workplace environment and safety • Handling of material • Use of firefighting equipment • Enterprise first aid • Hazard control and hazardous material and substances
Information	May include but not limited to: • Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, Material Safety Data Sheets (MSDS), diagrams or sketches • Safe work procedures related to the preparation of vehicle components for paint repair • Regulatory/legislative requirements pertaining to automotive painting and finishing

	• Engineer's design specifications and instructions • Organisation work specifications and requirements • Instructions issued by authorised enterprise or external persons • International standards
Components	May include but not limited to: • In-situ panels • Doors • Plastic components • Glasswork • Bonnets • Cabin • Body parts
Materials	May include but not limited to: • Primary paint. • Final paint. • Body fillers • Putty • Cleaning agents and materials • Sand papers. • Cleaning rags. • Masking tape. • Covering papers • Sheet metal
Equipment and tools	May include but not limited to: • Dryers • sprayers • Hand tools. • Body repair tools kits • Body hammer • Oxy acetylene welding • Arc welding machine • Power tools, compressor assembly. • Adhesive equipment • Spray gun • Grinding machine. • Grinding brush. • Putty knife • Scrapers • Paint brushes • Personal protective equipment
Safe operating procedures	May include but not limited to: • Operational risk assessment and treatments associated with vehicular movement, toxic substances, electrical safety, machinery movement and operation, manual and mechanical lifting and shifting, working in proximity to

	others and worksite visitors
Emergency procedures	May include but not limited to: • Emergency shutdown and stopping of equipment • Fire extinguishers. • Enterprise first aid requirements • Worksite evacuation
Environmental requirements	Are to include, but are not limited to: • Waste management, noise, dust and clean-up management
Quality requirements	Are to include, but are not limited to: • Regulations, including Australian standards • Internal company quality policies and standards • Enterprise operations and procedures
Communications	May include but not limited to: • Verbal and visual instructions and fault reporting and may include worksite specific instructions, written instructions, plans or instructions related to job/task, telephones and pagers
Personal protective equipment	• Is to include that prescribed under legislation/regulation/codes of practice and workplace policies and practices

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • Observing safety procedures and requirements • Communicating effectively with others involved in or affected by the work • Selecting, applying and checking methods /techniques appropriate to the operation • Cleaning and masking the areas/equipment for paint repairs. • Applyingpaints to manufacturer/component supplier specifications.

Required knowledge and Attitudes	Must demonstrate knowledge of: • WHS regulations/requirements, equipment, material and personal safety requirements • Environmental protection requirements/material disposal and storage requirements • Cleaning materials • Preparation methods • Primary paint application methods and procedures. • Enterprise quality procedures • Work organisation and planning processes • Types of paints and application methods. • Types of spray guns and maintenance requirements • Paint drying methods andprocedures
Required Skill	Must demonstrate skills to: • Collect, organise and understand information related to work orders, plans and safety procedures • Communicate ideas and information to enable confirmation of work requirements and specifications. • coordination of work with worksite supervisor, other workers and customers, • reporting of work outcomes and problems • Establish safe and effective work processes to resolve problems and downtime, • systematically develop solutions to avoid or minimise reworking and wastage • Use workplace technology, including the use of special tools and equipment, • Measuring equipment, computerised technology and communication devices and the reporting/documenting of results

Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard : Agricultural Machinery and Equipment Maintenance Level II	
Unit Title	**Apply Agricultural Extension service for Rural development**
Unit Code	**AGR MEM2 13 0322**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to promote the use of digital technology agricultural extension, understand adult learning, Integrated gender agricultural extension and Recognize Indigenous Knowledge

Element	**Performance Criteria**
1. Promote the use of digital technology in Agricultural Extension	1.1 The ***use of Digital technology in Agricultural extension*** is introduced to familiarize its importance 1.2 ***Skills in using digital technology*** is built to strengthen agricultural extension services 1.3 The ***roleof digital technologies in agricultural extension*** services is understood to enhance agricultural development.
2. Understand Adult Learning	2.1 The ***concept of adult learning*** is understood to bring behavioural changes 2.2 ***Principles of Adult learning*** is determined for the implementation of extension services 2.3 The ***importance of Adult learning*** in Agricultural Extension is understood to enhance agricultural extension services 2.4 ***Adult learning methods*** are understood to enhance the knowledge and skills of extension beneficiaries 2.5 ***The role of adult learning*** is understood to allow farmers develop knowledge and skills
3. Integrate Gender in Agricultural Extension	3.1 The ***concept of gender*** is understood to provide inclusive agricultural extension services 3.2 Gender awareness and sensitization is created to increase the contribution of gender in agricultural development 3.3 The ***role of gender in agriculture*** is determined to enhance agricultural development. ***3.4 Gender mainstreaming*** is implemented for effective outcome of extension services
4. Recognize Indigenous Knowledge	4.1. The ***concept of indigenous knowledge*** is understood to strengthen the service of agricultural extension 4.2. ***Characters of indigenous knowledge*** are understood to promote local experience 4.3. ***Exchange of indigenous knowledge*** is promoted to enhance community development

	4.4. The ***importance of indigenous knowledge*** is understood to facilitate its contribution to the development processes. 4.5. The ***controversial issues of the debate on indigenous knowledge*** are further studied to propose the urgent need, to document, learn, preserve, and exchange indigenous knowledge

Variable	**Range**
Use of Digital technology in Agricultural extension	May include but not limited to: • Define Digital Technology • Evolution and progress of digital technologies • Digital technology for Agricultural Extension • Tools for digital technology • Utilization of digital technologies
Skills in using digital technology	May include but not limited to: • Demonstrate digital technologies • Practice digital technologies • Apply digital technologies • Maintain and manage digital technologies
Role of digital technologies in agricultural extension	May include but not limited to: • Provide diverse knowledge to beneficiaries • Supply Efficient information products • Provide technology-related advice • provide location-specific market information • enhance technology adoption in agriculture
Concept of adult learning	May include but not limited to: • Adult learning theories • Characteristics • Adult learning approaches • Purpose of Adult learn • Adult learning practices
Principles of Adult learning	May include but not limited to: • Self-directed • Experiential • Problem-centered • Motivated to learn • Learner oriented • Practice Oriented • looks for help and mentorship • Open for modern ways of learning • Choose how to learn

Importance of Adult learning	May include but not limited to; • Increase effective participation in decision making • Improves individuals' technology utilization • Enhances working efficiency, • Keep up with the growing economic competition • Self-improvement • Financial growth and benefit
Adult learning methods	May include but not limited to: • Visual Aids • Audio • Print Media • Tactile • Interactive
The role of adult learning	May include but not limited to: • Behavioral change • Enhance to acquire new skills and knowledge • Access disadvantaged groups • Promote Participatory decision making
Concept of gender	May include but not limited to: • Definition of Gender • Historical development of Gender • Importance of Gender • Gender awareness and sensitization
Role of gender in agriculture	May include but not limited to: • Women's contribution in Agricultural Production • Women's participations in rural labor market • Women's participation in Agricultural Extension • Gender difference in rural labor markets • Impact of gender role in Agricultural Extension services
Gender mainstreaming	May include but not limited to: • Understanding of gender equality • Mainstreaming strategy • Steps of gender mainstreaming
Concept of indigenous knowledge	May include but not limited to: • Definition of Indigenous knowledge • Historical development of indigenous knowledge • Importance of indigenous knowledge for development processes
Characters of indigenous knowledge	May include but not limited to: • Experiences • its compatibility with indigenous environment and culture • insufficient knowledge of rural people • combination of culture, belief and religion

Exchange of indigenous knowledge	May include but not limited to: • Recognition and identification • Validation of indigenous knowledge • Recording and document indigenous knowledge • Storage in retrievable repositories • Dissemination of indigenous knowledge • Utilization of indigenous knowledge
Importance of indigenous knowledge	May include but not limited to: • Problem solving strategies • Important component of global knowledge • Resource in the development processes • Understanding of local conditions • Increase responsiveness of client • Enhance cross cultural understanding
Controversial issues of the debate on indigenous knowledge	May include but not limited to: • Discrimination, • Exploitation, • Dispossession • Miss-Used And • Miss- Appropriation • Violation Of The Right Of Indigenous People

Evidence Guide	
Critical Aspects of Competence	Demonstrate knowledge attitude and skill to: • Use of Digital technology in Agricultural extension • Applies the role of digital technologies in agricultural extension • Implements Adult learning methods • Implements Gender mainstreaming • Facilitates the Exchange of indigenous knowledge • Understands the controversial issues of the debate on indigenous knowledge
Required Knowledge and Attitudes	Demonstrates knowledge of - • Understands concept of adult learning • Recognize the Principles of Adult learning • Appreciates the importance of Adult learning • Understands the concept of gender • Understands the concept of indigenous knowledge • Understand the Characters of indigenous knowledge • Appreciates the importance of indigenous knowledge • Understands the controversial issues of the debate on indigenous knowledge

Required Skills	Demonstrates skills: • Demonstrates the use of Digital technology in Agricultural extension • Applies the role of digital technologies in agricultural extension • Implements the Adult learning methods • Understands and implements the role of adult learning • Understands and implement the role of gender in agriculture • Implements Gender mainstreaming • Facilitates the Exchange of indigenous knowledge
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and Occupational health and safety (OHS) practices.
Methods of Assessment	Competence may be assessed through: • Written Test, Interview, Quiz, Practical assignment • Observation and Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Operation Level II	
Unit Title	**Prevent and Eliminate MUDA**
Unit Code	**AGR MEM2 11 0322**
Unit Descriptor	This unit covers the knowledge, skills and attitude required by a worker to prevent and eliminate MUDA/wastes in his/her workplace by applying scientific problem-solving techniques and tools to enhance quality, productivity and other kaizen elements on continual basis. It covers responsibility for the day-to-day operation of the work and ensures Kaizen Elements are continuously improved and institutionalized.

Element	Performance Criteria
1. Prepare for work.	1.1. Work instructions are used to determine job requirements, including method, material and equipment. 1.2. Job specifications are read and interpreted following working manual. 1.3. ***OHS requirements***, including dust and fume collection, breathing apparatus and eye and ear personal protection needs are observed throughout the work. 1.4. Appropriate material is selected for work. 1.5. ***Safety equipment and tools*** are identified and checked for safe and effective operation.
2. Identify MUDA and problem	2.1 Plan of MUDA and problem identification is prepared and implemented. 2.2 Causes and effects of MUDA are discussed. 2.3 All possible problems related to the process /Kaizen elements are listed using ***statistical tools and techniques***. 2.4 All possible problems related to kaizen elements are identified 2.5 are used to draw and analyze current and listed on Visual Management Board/Kaizen Board. 2.6 ***Tools and techniques*** situation of the work place. 2.7 Wastes/MUDA are identified and measured based on ***relevant procedures***. 2.8 Identified and measured wastes are reported to relevant personnel.
3. Analyze causes of a problem.	3.1 All possible causes of a problem are listed. 3.2 Cause relationships are analyzed using***4M1E***. 3.3 Causes of the problems are identified. 3.4 The root cause which is most directly related to the problem is selected. 3.5 All possible ways are listed using ***creative idea generation*** to eliminate the most critical root cause. 3.6 The suggested solutions are carefully tested and evaluated for potential complications. 3.7 Detailed summaries of the action plan are prepared to implement the suggested solution.

4. Eliminate MUDA and Assess effectiveness of the solution.	4.1. Plan of MUDA elimination is prepared and implemented by ***medium KPT*** members. 4.2. Necessary attitude and the ***ten basic principles*** for improvement are adopted to eliminate waste/MUDA. 4.3. Tools and techniques are used to eliminate wastes/MUDA based on the procedures and OHS. 4.4. Wastes/MUDA are reduced and eliminated in accordance with OHS and organizational requirements. 4.5. ***Tangible and intangible results*** are identified. 4.6. Tangible results are compared with targets using ***various types of diagrams***. 4.7. Improvements gained by elimination of waste/MUDA are reported to relevant bodies.
5. Prevent occurrence of wastes and sustain operation.	5.1. Plan of MUDA prevention is prepared and implemented. 5.2. Standards required for machines, operations, defining normal and abnormal conditions, clerical procedures and procurement are discussed and prepared. 5.3. Occurrences of wastes/MUDA are prevented by using ***visual and auditory control methods***. 5.4. Waste-free workplace is created using ***5W and 1H***sheet. 5.5. The completion of required operation is done in accordance with standard procedures and practices. 5.6. The updating of standard procedures and practices is facilitated. 5.7. The capability of the work team that aligns with the requirements of the procedure is ensured and trained on the new ***Standard Operating Procedures (SOPs)***.

Variable	**Range**
OHS requirements	May include, but not limited to: • Are to be in accordance with legislation/ regulations/codes of practice and enterprise safety policies and procedures. This may include protective clothing and equipment, use of tooling and equipment, workplace environment and safety, handling of material, use of fire fighting equipment, enterprise first aid, hazard control and hazardous materials and substances. • PPE are to include that prescribed under legislation/regulations/codes of practice and workplace policies and practices. • Safe operating procedures are to include, but are not limited to the conduct of operational risk assessment and treatments associated with workplace organization. • Emergency procedures related to this unit are to include but may not be limited to emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation.

Safety equipment and tools	May include, but not limited to: • Dust masks/goggles • Glove • Working cloth • First aid and • Safety shoes
Statistical tools and techniques	May include, but not limited to: • 7 QC tools May include, but not limited to: ➢ Stratification ➢ Pareto Diagram ➢ Cause and Effect Diagram ➢ Check Sheet ➢ Control Chart/Graph ➢ Histogram and Scatter Diagram • QC techniques May include, but not limited to: ➢ Brain storming ➢ Why analysis ➢ What if analysis ➢ 5W1H
Tools and techniques	May include, but not limited to: • Plant Layout • Process flow • Other Analysis tools • Do time study by work element • Measure Travel distance • Take a photo of workplace • Measure Total steps • Make list of items/products, who produces them and who uses them & those in warehouses, storages etc. • Focal points to Check and find out existing problems • 5S • Layout improvement • Brainstorming • And on • U-line • In-lining • Unification • Multi-process handling &Multi-skilled operators • A.B. control (Two point control) • Cell production line • TPM (Total Productive Maintenance)
Relevant procedures	May include, but not limited to: • Make waste visible • Be conscious of the waste • Be accountable for the waste and measure the waste.

4M1E	May include, but not limited to: • Man • Machine • Method Material and Environment
Creative idea generation	May include, but not limited to: • Brainstorming • Exploring and examining ideas in varied ways • Elaborating and extrapolating • Conceptualizing
Medium KPT	May include, but not limited to: • 5S • 4M (Machine, Method, Material and Man) • 4p (Policy, Procedures, People and Plant) • PDCA cycle Basics of IE tools and techniques
The ten basic principles for improvement	May include, but not limited to: • Throw out all of your fixed ideas about how to do things. • Think of how the new method will work- not how it won. • Don't accept excuses. Totally deny the status quo. • Don't seek perfection. A 5o percent implementation rate is fine as long as it's done on the spot. • Correct mistakes the moment they are found. • Don't spend a lot of money on improvements. • Problems give you a chance to use your brain. • Ask "why?" At least five times until you find the ultimate cause. • Ten people's ideas are better than one person's. • Improvement knows no limits.
Tangible and intangible results	May include, but not limited to: • Tangible result may include quantifiable data • Intangible result may include qualitative data
various types of diagrams.	May include, but not limited to: • Line graph • Bar graph • Pie-chart • Scatter diagrams • Affinity diagrams
Visual and auditory control methods	May include, but not limited to: • Red Tagging • Sign boards • Outlining • And ones • Kanban, etc.

5W and 1H	May include, but not limited to: • Who • What • Where • When • Why and • How
Standard Operating Procedures (SOPs).	May include, but not limited to: • The customer demands • The most efficient work routine (steps) • The cycle times required to complete work elements • All process quality checks required to minimize defects/errors • The exact amount of work in process required

Evidence Guide	
Critical Aspects of Competence	Demonstrate knowledge and skills to: • Discuss why wastes occur in the workplace • Discuss causes and effects of wastes/MUDA in the workplace • Analyze the current situation of the workplace by using appropriate tools and techniques • Identify, measure, eliminate and prevent occurrence of wastes by using appropriate tools and techniques • Use 5W and 1H sheet to prevent • Detect non-conforming products/services in the work area • Apply effective problem-solving approaches/strategies. • Implement and monitor improved practices and procedures • Apply statistical quality control tools and techniques.

Required Knowledge and Attitude	Demonstrate knowledge of: • Targets of customers and manufacturer/service provider • Traditional and kaizen thinking of price setting • Kaizen thinking in relation to targets of manufacturer/service provider and customer • value • The three categories of operations • the 3“MU” • wastes occur in the workplace • The 7 types of MUDA • QC story/PDCA cycle/ • QC story/ Problem solving steps • QCC techniques • 7 QC tools • The Benefits of identifying and eliminating waste • Causes and effects of 7 MUDA • Procedures to identify MUDA • Necessary attitude and the ten basic principles for improvement • Procedures to eliminate MUDA • Prevention of wastes • Methods of waste prevention • Definition and purpose of standardization • Standards required for machines, operations, defining normal and abnormal conditions, clerical procedures and procurement • Methods of visual and auditory control • TPM concept and its pillars. • Relevant OHS and environment requirements • Method and Lines of communication • Methods of making/recommending improvements. • Reporting procedures • Workplace procedures associated with the candidate's regular technical duties • organizational structure of the enterprise

Required Skills	Demonstrate skills to: • Draw &analyze current situation of the work place • Use measurement apparatus (stop watch, tape, etc.) • Calculate volume and area • Apply statistical analysis tools • Use and follow checklists to identify, measure and eliminate wastes/MUDA • Identify and measure wastes/MUDA in accordance with OHS and procedures • Use tools and techniques to eliminate wastes/MUDA in accordance with OHS procedure. • Apply 5W and 1H sheet • Update and use standard procedures for completion of required operation • Apply Visual Management Board/Kaizen Board. • Detect non-conforming products or services in the work area • Work with others • Read and interpret documents • Observe situations • Solve problems • Communicate information • Gather evidence by using different means • Report activities and results using report formats • Implement and monitor improved practices and procedures
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

NTQF Level III

Occupational Standard: Agricultural Machinery and Equipment Maintenance LIII	
Unit Title	**Perform Engine Tune up**
Unit Code	**AGR_MEM3 01 0322**
Unit Descriptor	This unit covers the knowledge, attitudes and skills required to Conduct exhaust gas and oscilloscope test, carryout power balance test, conduct cylinder head leak test, conduct compression testing, test /adjust dwell angle and ignition setting, engine idle speed and mixture, check/adjust valve clearance , bleeding injection system components and prepare for tune up work

Elements	Performance Criteria
1. Prepare for tune up work	1.1 Workstation is made ready for tune up activities 1.2 Necessary ***tools, equipment*** and materials are identified and made ready for use 1.3 ***Injection system components*** are checked and made ready for ***tune up*** 1.4 injection required in setting injection timing is positioned and inspected as per manufacturer's manual 1.5Injection timing setting is re-checked following instructional ***manuals*** 1.6. belts and battery are checked and inspected 1.7 Timing advance operation checked
2. Bleeding injection system components	2.1 Fuel level, line leakage and fuel strainer/filter are checked 2.2 Air lock free fuel system is determined without error 2.3 Bleed screw and primer pumps are identified without error. 2.4 Timing marks, torque and injection pump moving parts motion is re-checked before installation 2.5 Injection nozzle is serviced and tested 2.6 Injection pump requirement in installing injection pump per manual instruction is set-up 2.7 Mounting bolts are tightened following torque sequence, pattern and specification in the manual
3. Check/adjust valve clearance	3.1. Valve clearance is set and adjusted following manufacturer's specifications 3.2. Test result analyzed and appropriate recommendations are prescribed. 3.3. Valve clearance adjustment performed according to firing order
4. Test /adjust dwell angle and ignition setting, engine idle speed and mixture	4.1 Dwell angle is adjusted 4.2 Ignition timing is set and adjusted 4.3 Engine speed (rpm) is checked 4.4 Testing and checking are performed without damage to the system and its components
5. Conduct compression testing	5.1 Engine requirements in compression testing is set up 5.2 Compression test is conducted without damage or injury to

	person or property 5.3 Specific compression test result is read and interpreted 5.4 Corresponding recommendation/prescription is given based on the test result.
6. Conduct cylinder head leak test	6.1.Engine requirements in air leakage testing is set up 6.2.Cylinder head leakage test is conducted without damage or injury to person or property 6.3.test result is read and interpreted
7. Carryout power balance test	7.1 Engine requirements in power balance testing is set up 7.2 test is conducted without damage or injury to person or property 7.3 Specific test result is compared and interpreted
8. Conduct exhaust gas and oscilloscope test	8.1.Engine requirements in exhaust gas testing is set up 8.2.test is conducted without damage or injury to person or property 8.3.Specific test result is read and interpreted

Variable	**Range**
Tools and equipment	May include but not limited: • Common and special service hand tools • Cleaning tools • power tools, • Compression tester • Cylinder leakage tester • Power balance tester • Exhaust gas analyzer • Oscilloscope • Stethoscope • Belt tensioner • Measuring equipment • Lifting equipment • Testing equipment • Filler gage • Nozzle tester • Stroboscope (timing light) • Engine analyzer
Injection system components	May include but not limited to: • Governor and Delivery valve
Tune up	May include but not limited to: • Ignition system including conventional ignition system • Fuel system • Engine system
Manuals	May include but not limited to: • Manufacturer specification manual • Maintenance procedure manual • Service manual • Parts Checklist/catalogue

Evidence guide	
Critical aspects of competence	Must demonstrate knowledge and skills of: • Apply OHS • Diesel engine tune up is performed • Injection pump is adjusted to engine • Injection pump and injector is inspected and tested. • Valves are adjusted • Injection pump timing is performed • Compression, leakage. Exhaust gas test are applied • Engine fuel injection marks, use and location • Timing mark interpretation, use/application and meaning
Required knowledge and attitudes	Must demonstrate knowledge of: • Occupational health and safety measures and procedures • Engine operating principles • Compression and leakage testing procedure and precaution • Engine parts failure • Effects of low compression pressure to diesel fuel injection system • Cleaning parts, methods, procedures and materials • Engine fuel injection marks, use and location • Type of lubricants and fluids • Procedure in setting fuel injection timing • Timing mark interpretation, use/application and meaning • Use/application and maintenance manual • Procedure in re-checking injection timing • Servicing inspection checklist • Manual handling techniques • Positive work values (perseverance, honesty, attention to details)
Required skills	Must demonstrate skills of: • Adjusting injection pump timing • Interpreting results from compression testing • Interpreting test results • Handling of parts, cleaning tools • Handling equipment such as tester and pressurized gases • Applying of compression, leakage, engine analyzer, timing light, testing equipment • Bleeding diesel fuel injection system • Writing reports • Using relevant tools and equipment safely • Applying adjustment procedures
Resource implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Assessment methods	Competence may be assessed through: • Interview / written test

	• Observation / demonstration with oral questioning
Context of assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Agricultural machinery and Equipment maintenance LIII	
Unit Title	**Service Electrical Fuel Injection System and Components**
Unit Code	**AGR MEM3 02 0322**
Unit Descriptor	This unit covers the knowledge, attitudes and skills required to preparation for work, servicing of diesel and gasoline EFI system components and completion of work processes.

Elements	Performance Criteria
1. Prepare for work	1.1 Service work requirements are identified and confirmed. 1.2 Procedures and information such as workshop manuals, specifications and ***tooling*** and equipment are acquired. 1.3 Methods in identifying diesel and gasoline ***electronic fuel injection components*** are applied. 1.4 Appropriate service equipment are selected and prepared. 1.5 Technical and/or calibration requirements for the testing and overall of the system are sourced and support equipment identified and prepared. 1.6 ***OHS*** and warnings in relation to working with diesel and gasoline vehicle are observed throughout the work operation. 1.7 Applicable national environmental protection measure/ guidelines is sourced and observed throughout the work operation.
2. Repair/service electronic diesel injection components	2.1 Extent of work is determined and confirmed. 2.2 Appropriate system test is implemented in accordance with workplace procedures and manufacturer specifications. 2.3 ***Repair/Service*** of diesel electronic components and gasoline fuel injection system and its ***components*** is carried out 2.4 Results are documented with evidence, supporting information and recommendations. 2.5 Report is forwarded to appropriate persons for action in accordance with workplace procedures. 2.6 Results are compared with manufacturer specifications to verify and indicate compliance or non-compliance. 2.7 Repair/Service work schedule documentation is completed.
3. Service electronic gasoline fuel injection components	3.1. Appropriate test applications and inspections are applied 3.2. Injection are adjusted and replaced 3.3. Common rail fuel supply systems are checked, inspected and repaired

	3.4. Service and repair related components according to service specifications 3.5. Results are documented with evidence, supporting information and recommendations. 3.6. Repair/Service work schedule documentation is completed 3.7. Report is forwarded to appropriate persons for action in accordance with workplace procedures.

Variable	**Range**
Tools requirements	May include but not limited to: • Hand tooling, • power tooling, • OBD Tool , • engine analysers, • Pressure testers. • Nozzle tester • Exhaust gas analyser
Electronic fuel injection components	May include but not limited to: • Common rail • Unit injector • Feed pump • Fuel lines • Fuel tank • Fuel filters • Fuel gauges • Sensors
OHS	May include but not limited to: • Are to be in accordance with legislation/regulations/codes of practice and enterprise safety policies and procedures. This may include protective clothing and equipment, use of tooling and equipment, workplace environment and safety, handling of materials, use of fire fighting equipment, enterprise first aid, hazard control and hazardous materials and substances. • Personal protective equipment is to include that prescribed under legislation/regulations/codes of practice and workplace policies and practices. • Safe operating procedures are to include, but are not limited to the conduct of operational risk assessment and treatments associated with vehicular movement, toxic substances, electrical safety, machinery movement and operation, manual and mechanical lifting and shifting, working in proximity to others and site visitors. • Emergency procedures related to this unit are to include, but are not limited to emergency shutdown and stopping of equipment, extinguishing fires, enterprise

	first aid requirements and site evacuation.
Repair/Service	May include but not limited to: • Complete dismantling of component parts, measuring and evaluation of wear, the replacement, repair, the assembly of parts, performance of functional testing and the completion of records • Clean, disassemble, evaluate, source parts, reassemble, test
System components	May include but not limited to: • The three sub-systems of an EFI: ➢ Fuel delivery system ➢ Air induction system ➢ Electronic control unit ➢ Common rail
Gasoline fuel injection system	May include but not limited to: • Light vehicles, heavy vehicles, motorcycles, small engines and outdoor power equipment. • Systems may be two-stroke and/or four-stroke and electronic fuel injection system • Conventional EFI
Diesel fuel injection system	May include but not limited to: • May be in light vehicles, heavy vehicles, motorcycles, small engines and outdoor power equipment. • Systems may be two-stroke and/or four-stroke and electronic fuel injection system

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • Prepared for work electronic fuel injection system and its components • Tested and analysed diesel and gasoline electronic fuel

	injection system and its components • Performed repair / service of diesel and gasoline electronic fuel injection system and components for both engine • Prepared diesel and gasoline electronic fuel injection system for normal service
Required Knowledge and Attitudes	Must demonstrate knowledge of: • OHS and environmental regulations/requirements, equipment, material and personal safety requirements • Operating principles of electronic feed pumps • Types and layout of service/repair manuals • Understanding repair and service principles and procedures • Diagnostic/Test procedures • Operating principles of machines and equipment and their relationship to each other • Operating principles of diesel and gasoline electronic fuel injection • Repair procedures
Required Skills	Must Demonstrate knowledge and skills of: • Testing and analyzing results • Communication with others • Diagnostic techniques and procedures • Repairing/servicing procedures and techniques • Report writing
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Assessment Methods	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational standard: Agricultural Machinery and Equipment Maintenance Level III	
Unit Title	**Repair Air Conditioning System**
Unit Code	**AGR MEM3 03 0322**
Unit Descriptor	This unit covers the competence required to repair air conditioning system components. The unit includes identification and confirmation of the work requirement, preparation for work, testing and analysis of systems, dismantling, reassembling and retesting of air conditioning system components and completion of work finalisation processes, including clean-up and documentation.

Elements	Performance Criteria
1. Prepare to diagnose and repair air conditioning	1.1 Job requirements are determined from workplace instructions 1.2 ***OHS requirements*** and ***Personal Protective Equipment*** needs are applied throughout the work. 1.3 Diagnostic information is sourced and interpreted 1.4 Diagnostic options are analysed and those most appropriate to the work are selected 1.5 **Workplace *information sources*** and technical and/or calibration requirements are accessed for repairing air conditioning components**.** 1.6 Hazards associated with the work are identified and risks are managed according to **environmental requirement**. 1.7 Repair tools, ***equipment and materials*** are selected and checked according to manufacturer specifications and workplace procedures 1.8 Diagnostic tools and equipment are selected and checked for serviceability
2. Diagnose air conditioning	2.1 Diagnostic tests are carried out according to workplace procedures. 2.2 ***Safe operating procedures*** are applied. 2.3 Faults are identified from diagnostic test results and causes of faults are determined 2.4 Diagnosis findings and recommendations for necessary repairs or adjustments are reported according to workplace procedures
3. . Repair air conditioning	3.1 **Repair method** is applied according to work procedure. 3.2 Repair options are analysed and those most appropriate to the work are selected 3.3 Repairs and component replacements and adjustments are carried out according to requirements, and without causing damage to components or systems. 3.4 System is recharged with the appropriate refrigerant gas according to manufacturer specifications and workplace procedures 3.5 Post-repair testing is carried out according to workplace procedures to confirm **quality requirement.**
4. Complete work processes	4.1 Final inspection is made to ensure work is to workplace expectations and the vehicle or machinery is presented ready for use 4.2 Final inspection is made to ensure protective guards, safety features and cowlings are in place. 4.3 Work area is cleaned, waste and non-recyclable materials are disposed of, and recyclable material is collected.

	4.4 Tools and equipment are checked and stored and faulty electrical equipment is identified, tagged and isolated according to workplace procedures 4.5 Workplace documentation are completed and processed according to workplace procedures.

Variable	**Range**
OHS requirements	May include but not limited to: • Working with refrigerants at boiling point given risk of frostbite • Working with system lubricants, including carcinogenic oils • Handling flammable refrigerants • Using personal protective equipment (PPE) • Identifying and using fire safety equipment • Environmental requirements, including procedures for preventing loss of refrigerant to the atmosphere. • Repairs and component replacement and adjustment requirements must include:
Tooling and equipment	May include but not limited to: • Hand tooling • Cleaning equipment • Sealing equipment • Leak detection equipment • Evacuation equipment • Heating/soldering equipment • Refrigerant recharging equipment
Materials and equipment	May include but not limited to: • Compressors • Air dryer • Evaporators • Condensers • Fan and belt system • Refrigeration oils • Refrigerants • Spare parts and cleaning materials
Information **sources**	May include but not limited to: • Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches • Safe work procedures related to repairing air conditioning system components • Regulatory/legislative requirements pertaining to the automotive industry, including International design Rules • Organization work specifications and requirements • Instructions issued by authorized enterprise or external persons • International standards
Safe operating procedures	May include but not limited to: • The conduct of operational risk assessment and treatments

	associated with: ➢ Vehicular movement, ➢ Toxic substances, ➢ Electrical safety, ➢ Equipment movement and operation, ➢ Manual and mechanical lifting and shifting, ➢ Working in proximity to others and site visitors
Emergency procedures	May include but not limited to: • Emergency shutdown and stopping of equipment • Extinguishing fires • Enterprise first aid requirements and site evacuation
Repair methods and sequences	May include but not limited to : • Complete dismantling of component parts, • Measuring and evaluation of wear • The replacement, repair • Rebuilding or reconditioning of parts comparable to original parts • The assembly of parts • Performance of functional testing and the completion of records
Environmental requirements	May include but are not limited to: • Waste management, noise, dust and clean-up management
Quality requirements	May include but are not limited to: • Regulations, including International standards, internal company quality policy and standards and enterprise operations and procedures

Evidence Guide	
Critical Aspects of Competence	Must demonstrate skills and knowledge in: • applying safety procedures and requirements • communicating effectively with others involved in or affected by the work • Identify and determine faults from diagnostic test results • Interpret diagnostic information • Select and analyse diagnostic options • Identify hazards associated with the work • applyrepair method according to work procedure • make final inspection • Check tools and equipment • Identify, and isolate electrical equipment faults
Required Knowledge and Attitudes	Demonstrate knowledge of: • OHS and environmental regulations/requirements, equipment, material and personal safety requirements • identification of the application, purpose and operation • identification of component parts to include physical, fluid, gases and heat generation • identification of wear evaluation methods • types and layout of service/repair manuals • damage that may occur to electronic control units by the use of poor work practices

	• measuring and testing procedures • nature and characteristics of refrigerant • component repair/overhauling procedures • enterprise quality procedures • work organization and planning procedures
Required Skills	Demonstrate skills to: • apply manufacturer/component supplier procedures, workplace policies and procedures • apply analytical skills required for identification and analysis of technical information • diagnose and repair a fault in the air conditioning • establish safe and effective work processes which anticipate and/or resolve problems and downtime • Develop solutions to avoid or minimize reworking and avoid wastage • Apply workplace technology related to the overhaul of air conditioning systems. • Reporting/documenting of results •
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level III	
Unit Title	**Repair and Install Pneumatic Systems/Components**
Unit Code	**AGR MEM3 04 0322**
Unit Descriptor	This unit competence covers knowledge ,attitude and skill required to conduct and analyse pneumatic system tests, service, repair and install pneumatic systems/ components and prepare to repair pneumatic systems/ Components

Elements	Performance Criteria
1. Prepare to repair pneumatic systems/ Components	1.1 Work requirements are identified and confirmed. 1.2 ***OHS requirements*** and ***personal protection needs*** are applied throughout the work. 1.3 Procedures and ***information*** such as workshop manuals and specifications are arranged. 1.4 Method options are selected and prepared. 1.5 Technical and testing requirements for pneumatic systems are prepared and support equipment is identified. 1.6 Support ***tooling and equipment*** are selected and prepared for use. 1.7 Warnings are observed in relation to working with pneumatic systems.
2. Service, repair and install pneumatic systems/ components	2.1 Removing, assembly and repairing are implemented in accordance with workplace procedures 2.2 Adjustments are made during the assembly, repair and installation in accordance with manufacturer specifications. 2.3 Documentation of observations is completed.
3. Conduct and analyse pneumatic system tests	3.1 Methods for tests are implemented in accordance with workplace procedures and manufacturer specifications. 3.2 Test results are compared with manufacturer/component supplier specifications. 3.3 Air braking test results are compared with manufacturer specifications to indicate compliance or non-compliance. 3.4 Air assisted doors, horns etc are tested 3.5 Final checks and adjustments are made. 3.6 Results are documented with evidence and supporting information and recommendation(s) made. 3.7 Final inspection is made to ensure work is to workplace

	expectations. 3.8 Pneumatic systems are cleaned for use or storage to workplace expectations. 3.9 Report is forwarded to persons for action in accordance with workplace procedures.

Variable	**Range**
Tooling and equipment	May include but not limited; • Hand tools • Power tools • Gauges • Load and pressure testing devices • Air compressor
Materials	May include: • Spare parts, • Lubricants, • Fluids and cleaning materials
Component	May include but not limited • Compressors, • Actuators, • Pressure lines, • Receivers and valves • Electrical control units • Air suspension • Air assisted doors and horn

Safe operating procedures	May include but not limited to : • Vehicular movement • Toxic substances • Electrical safety • Equipment movement and operation • Manual and mechanical lifting and shifting • Working in proximity to others and site visitors
Emergency procedures	May include but not limited to: • To emergency shutdown and stopping of equipment • Extinguishing fires • Enterprise first aid requirements and site evacuation
Environmental requirements	May include but not limited to: • Waste management, noise, dust and clean-up management
Quality requirements	May include but not limited to: • Regulations including Ethiopian Standards, internal company quality policy and standards and enterprise operations and procedures

Evidence guide	
Critical aspects of competence	Demonstrates skills and knowledge competence in: • Apply safety procedures and requirements • Communicating effectively with others involved in or affected by the work • Selecting methods and techniques, appropriate for test and adjustment work • Conducting removing, assembling, repairing and installation of pneumatic components based on workplace requirements • Interpreting test results • Completing work within workplace timeframes and without damage • Pneumatic system adjustments and final tests are implemented
Required knowledge and attitudes	Demonstrate knowledge of: • OHS and environmental regulations/requirements, equipment, material and personal safety requirements • Types, characteristics, uses and limitations of common pneumatic systems • Operating principles of pneumatic systems and their relationship to each other • Dangers of working with pneumatic systems • Types and layout of service/repair manuals • Techniques for interpretation of schematic diagrams relevant to pneumatic systems • Techniques for reading and interpreting engineering drawings

	• Pneumatic systems test procedures • Pneumatic systems assembly, repair and installation procedures • Enterprise quality procedures • Work organisation and planning processes
Required skills	Demonstrates skills to: • Interpret and apply manufacturer/component supplier procedures, workplace policies and procedures • Apply planning and organising skills to own work activities, sorting out priorities and monitoring own performance • Apply accurate measurements, calculate material requirements and establish quality checks • Develop capacity to apply problem-solving strategies, critical thinking and a creative approach to achieve an outcome • Apply workplace technology related to the assembly and installation of pneumatic systems/components, • Diagnose, inspect and adjust system components • Documenting/recording of results are implemented
Resources implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Methods of assessment	Competency may be assessed through: • Interview / written test • Observation / demonstration/ with oral questioning
Context of assessment	Competency may be assessed in the work place or in a simulated work place setting

Occupational standard: Farm Machinery and Equipment Maintenance Level III	
Unit Title	**Repair and Install Hydraulic Systems**
Unit Code	**AGRMEM3 05 0322**
Unit Descriptor	This unit competence covers knowledge ,attitude and skill required to Complete repair and installation, carry out repair and installation and Prepare to repair and install hydraulic systems

Elements	Performance Criteria
1. Prepare to repair and install hydraulic systems	1.1 **Workplace *information sources* are accessed and procedures strictly adhered.** 1.2 ***OHS requirements***, including requirements and ***Personal Protective Equipment*** needs are observed throughout the work. 1.3 Procedures and information such as workshop manuals and specifications, tools and ***equipment*** including ***materials*** are identified and prepared. 1.4 Technical requirements are used for testing; repairing and installing hydraulic systems are implemented. 1.5 Warnings are observed in relation to working with hydraulic systems.
2. Carry out repair and installation	2.1 ***Safe operating procedures*** are observed and noted during the use of tools/ equipment in accordance with workplace guidelines. 2.2 ***Emergency procedures*** are identified and followed as per organization's guideline. 2.3 Methods and techniques for repair and installation are implemented in accordance with workplace procedures and manufacturer specifications. 2.4 Careful removal of ***hydraulic components*** and hydraulic oil leakage prevention is applied. 2.5 Hydraulic parts and components cleaning, inspection, replacing seals/O-rings and required maintenance are performed. 2.6 Adjustments set up, correction and installation is implemented in accordance with manufacturer specifications. 2.7 Data collection, registration, documentation and Reporting are processed in accordance with workplace procedures. 2.8 Environmental requirements are observed and precautions implemented according to workplace and environmental

	protection regulation or guidelines**.**
3. Complete repair and installation	3.1 Final inspection is made to ensure leakage protection, components proper functionality and usage. 3.2 Final inspection is made to ensure safe work application in accordance with workplace expectations. 3.3 Farm machineries and equipment system are cleaned for use or storage to workplace expectations. 3.4 Repair and installation documentation is completed 3.5 Job card is processed in accordance with workplace procedures.

Variable	**Range**
OHS requirements	May include but not limited to: • Protective clothing and equipment • Use of tools and equipment • Workplace environment and safety regulation. • Handling and disposal of material • Use of fire fighting first aid equipment • Enterprise • Hazard control and hazardous materials and substances
Tools and equipment	May include but not limited to: • Hand tools, • pressure gauges, • Jacks and hoists. • Chain blocks • Hydraulic load testing devices
Materials	May include but not limited to: • hydraulic fluids • cleaning materials • Fluid containers. • Cleaning rugs. • Hydraulic fitting plugs • Hydraulic schematic diagrams
Safe operating procedures	May include but not limited to: • Operational risk assessment and treatments associated with machinery motion, • Toxic substances, electrical safety, • Equipment movement and operation,

	• Manual and mechanical lifting and shifting, • Working in proximity to others and site visitors
Emergency procedures	May include but not limited to: • Emergency shutdown and stopping of equipment • Fire extinguishing systems • Enterprise first aid requirements and site evacuation
Hydraulic components	May include but not limited to: • Tank • Hydraulic motor • Hydraulic pump • Valves and Fittings • Hydraulic lines and hoses • Hydraulic control and sensing devices
Environmental requirements	May include but not limited to: • Waste management and disposal policy, • Noise protection, • Dust and clean-up application
Other system components	May include but not limited to: • Disc pads, master cylinders, brake shoes, brake calipers, • Brake hoses, brake actuators and mechanical devices • The installation of linear or rotary actuators, conductors and control valves, power cylinders, hoses and couplings

Evidence Guide	
Critical Aspects of Competence	Must demonstrate skills and knowledge in: • Observing safety procedures and requirements • Selecting and preparing methods and techniques appropriate for maintenance • Identification, application, purpose and operating principles • Interpreting hydraulic schematic diagrams • Conducting repairing operation in accordance with workplace and manufacturer/component supplier requirements • Completing installation of hydraulic systems and associated components within workplace timeframes • Farm machineries and equipment hydraulic system presentation to customer in compliance with workplace requirements
Required Knowledge and Attitudes	Demonstrate knowledge of: • OHS and environmental regulations/requirements, • Equipment, material and personal safety requirements • Dangers of working with hydraulic equipment • Identification, application, purpose and operating principles

	• Operating principles of hydraulic systems and components with the relationship to each other, • Operation of actuators, conductors, pressure flow, and directional valves control systems • Types and layout of service/repair manuals (hard copy and electronic) • Hydraulic system operating procedures • Installation procedures • Enterprise quality procedures • Work organization and planning processes
Required Skills	Demonstrate skills to: • Interpret and apply manufacturer/component supplier procedures, workplace policies and guidelines • Apply technical skills for identification and analysis of information • Applycommunication skills sufficient to convey information and concepts to customers • Establish safe and effective work processes. • Resolve problems and avoid downtime and wastage • Complete installation of hydraulic systems, • Implement the use of special tools, measuring equipment, computerized technology and communication devices. • Documenting/recording of results
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level III	
Unit Title	**Repair Harvesting Machineries**
Unit Code	**AGR MEM3 06 0322**
Unit descriptor	This unit competence covers knowledge , attitude and sill required to Complete harvesting machine maintenance, carry out repair harvesting machine and prepare to repair harvesting machine

Element	Performance Criteria
1. Prepare to repair harvesting machine	1.1 Workplace information sources are identified. 1.2 OHS requirements and Personal Protective Equipment needs are applied throughout work. 1.3 ***Tools, equipment*** and ***materials*** are identified and prepared. 1.4 Method options are analysed and those most appropriate to the work are selected. 1.5 Technical and/or calibration requirements are applied. 1.6 Warnings are applied in relation to working with **harvesting machines**
2. Carry out repair harvesting machine	2.1 ***Procedures*** for repairing harvesting machineries are followed and applied. 2.2 Harvesting machineries are repaired according to manufacturer's repair manual instruction 2.3 Repair results are compared with manufacturer specifications to indicate compliance or non-compliance. 2.4 Results are documented with evidence and supporting information and recommendation(s) made.
3. Complete harvesting machine maintenance	3.1 Equipment and systems are run and final adjustments with oil, grease are made to achieve and maintain operating parameters. 3.2 Equipment is cleaned for use or storage to workplace expectations. 3.3 Repairs documentation is completed. 3.4 Job card is processed in accordance with workplace procedures. 3.5 Necessary data is recorded, documented and reported for the concerned body

Variable	Range
Tooling and equipment	May include but not limited to : • Hand tooling • Diagnostic and monitoring systems • Meters, gauges, load testing devices • Pulling and pushing devices
Materials	May include but not limited to • Spare parts, lubricants • Fluids and cleaning materials
machinery/equipment	May include but not limited to • Combine harvester • Corn picker • Cotton picker • Sugarcane chopper harvester

	• Fruit picker • coffee harvester • maize Sheller and thresher
Safe operating procedures	May include but not limited to: • The conduct of operational risk assessment and treatments associated with: ➢ Vehicular movement, ➢ Hazardous substances, ➢ Electrical safety, ➢ Equipment movement and operation, ➢ Manual lifting and shifting, working in proximity to others and site visitors
Procedure	May include but not limited to: • Visual, • aural and functional assessments, • including damage, • corrosion, • wear and electrical, • Mechatronic design process fault…
Emergency procedures	May include but are not limited to: • Emergency shutdown and stopping of equipment • Operating safely in the event of fires • Enterprise first aid requirements and site evacuation
Environmental requirements	May include but not limited to • Waste management, noise, • Dust and clean-up management
Quality requirements	May include but are not limited to: • Regulations, including International Standards, internal company quality policy and standards and enterprise operations and procedures
System components	May include but not limited to: • Seeding, crop planting • Spraying and spreading mechanism with their components

Evidence Guide	
Critical Aspects of Competence	Must demonstrate skills and knowledge competence in: • It is essential that competence in this unit signifies ability to transfer competence to changing circumstances and to respond to unusual circumstances in the critical aspects of: • Applying safety procedures and requirements • Communicating effectively with others involved in or affected by the work • Selecting methods and techniques appropriate to the work • Reading controller sensor • Completing a minimum of four full cycles requiring inspection, servicing, repair and preparing of harvesting machineries • Accurate interpretation of inspection results

	• Completion of inspection, service and repair in accordance with workplace and manufacturer manual instructions
Required Knowledge and Attitudes	Demonstrate knowledge of: • OHS and environmental regulations/requirements, equipment, material and personal safety requirements • Dangers of working with seeding, crop planting, spraying and their relationships to each other • Working mechanisms of harvesting machineries • Types and layout of service/repair manuals • Inspection procedures • Service procedures • work quality procedures
Required Skills	Demonstrate skills to: • Apply and search interpretive skills sufficient to locate, interpret and apply manufacturer procedures • Apply analytical skills required for identification and analysis of technical information • Apply planning and organising skills to own work activities, including making good use of time and resources, sorting out priorities and monitoring one's own performance • Apply repair and service of harvesting machineries equipped with high precision device • Establish safe and effective work processes which anticipate and/or resolve problems and downtime, to systematically develop solutions to avoid or minimise reworking and avoid wastage • Use workplace technology related to the inspection and servicing • Apply electronic measuring equipment, computerised technology and communication devices • Reporting/documenting of results
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test / Oral Questioning • Observation / Demonstration
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level III	
Unit Title	**Service and Repair irrigation pumps**
Unit Code	**AGR MEM3 07 0322**
Unit Descriptor	This unit covers the competence required to prepare and carry out servicing and repairing irrigation pumps. Describes the skills and knowledge required to carry out service and repair of generator and pump, to ensure the full function and flow of water and electric supplies; dismantle and assemble motors and pump mechanical components; and apply technical direction for troubleshooting.

Elements	Performance Criteria
1.Prepare to carry out service and repairs	1.1 **Workplace *information*** sources are accessed**,** interpreted and procedures strictly adhered**.** 1.2 ***OHS requirements*** and Personal Protective Equipment needs are applied throughout the work 1.3 Tools, equipment and materials appropriate to job requirements are selected and inspected for serviceability. 1.4 Appropriate procedure and **method** for repair and service are selected and prepared in accordance with standard ***safe operating procedures***. 1.5 Resources required for inspection of irrigation pump with ***power sources*** are identified and prepared.
2. Carry out service and repairs	2.1 Service and repairs of ***irrigation pumps*** are carried out according to manufacturer specifications, operator manuals and enterprise requirements. 2.2 irrigation pumps inspected for servicing or repair 2.3 Repair and overhauling irrigation pumps 2.4 Pumping efficiency, discharge rate and performance is checked 2.5 Complex faults and repairs are reported 2.6 Procedures are applied to minimise task time.
3. Complete repair and service activities	3.1 Complete service and repair activities 3.2 the pumps or components with it's power sources is reassembled and testedaccording to standard test procedure 3.3 Work site, **tools and equipment** are cleaned, returned to operating order and stored according to OHS and enterprise requirements. 3.4 Waste from service and repair activities is collected, treated and disposed or recycled according to enterprise **environmental requirements**. 3.5 Relevant information is documented.

Variable	Range
Workplace information	May include but not limited to: • Safe work procedures related to inspection and servicing of pumps

	• Engineer's design specifications and instructions • Organisation work specifications and requirements • Instructions issued by authorised enterprise or external persons • Operational manual • International Standards
OHS requirements	May include but not limited to: • Personal protective equipment and clothing • Safety equipment • First aid equipment • Hazard and risk control • Electrical safety • Elimination of hazardous materials and substances • Manual handling, including shifting, lifting and carrying • Emergency procedures
Methods	May include but are not limited to: • Visual, aural and functional assessments, including, damage, corrosion, fluid levels/leaks and wear
Safe operating procedures	May include but are not limited to: • The conduct of operational risk assessment and treatments associated with generator and pump, electrical safety, manual lifting and shifting, working in proximity to others and site visitors
Power sources	May include but are not limited to: • Diesel/petrol engines • Electric motors • Solar • Tractor PTOs
irrigation pumps	May include but are not limited to: • Centrifugal pumps • Submersible pumps • Solar water pumps • Treadle pumps
Tools and equipment	May include but are not limited to: • Hydrostatic tester • Hand tools • Water Meters • Power tools • Testing tools • Measuring tools
Materials	May include but are not limited to: • Pipes, fittings, and valves • Oils, lubricants ,spare parts • Cleaning materials

Emergency procedures	May include but are not limited to: • Operating safely in the event of fires, enterprise first aid requirements and site evacuation
Environmental requirements	May include but are not limited to: • Waste management, noise, dust and clean-up management

Evidence Guide	
Critical Aspects of Competence	Must demonstrate skills and knowledge in: • Applying safety procedures and requirements • Selecting methods and techniques appropriate to the required work. • Accurately inspecting and documenting and interpreting analysis results • Identify application, purpose and operating principles • Conducting service and repair of irrigation pump in accordance with workplace and manufacturer specifications • Completing the work within workplace timeframes • Equipment is presented to customer in compliance with workplace requirements
Required knowledge and Attitude	Must demonstrate knowledge of: • OHS and environmental regulations/requirements, equipment, material and personal safety requirements • Types and features of different irrigation pumps • Operating principles of irrigation pumps with power sources and relationship to each other • Types and layout of service/repair manuals • Service procedures • Repair procedures • quality procedures • Dangers of working with irrigation pump systems • Selection, checking and use of tooling and equipment • Manufacturer specifications • Environment, relevant to servicing and repairing of applicable legislation, regulations, standards and codes of practice, including OHS • Organizational policies and procedures, including quality requirements, reporting and recording procedures and work organisation and planning processes, • Servicing and repairing irrigation pumps

Required skills	Demonstrate skills to: • Maintain all components of irrigation pump • Carry out testing procedures to determine correct operation • Recognise and rectify mechanical faults • Carrying out inspect, service and repairs irrigation pumps to ensure the full function and flow of water • Dismantle and assemble irrigation pump and mechanical components • Apply technical direction for troubleshooting. • Reporting/ documenting of results
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level III	
Unit Title	**Maintain Post-Harvest Machinery and Equipment**
Unit Code	**AGR MEM3 08 0322**
Unit descriptor	These unit competences covers knowledge, attitude and skill the required Complete post-harvest equipment maintenance, service and repair post-harvesting equipment, conduct inspection and analyse results and prepare to inspect and service post-harvest equipment.

Elements	Performance Criteria
1. Prepare to inspect and service post-harvest equipment	1.1 Nature and scope of **post-harvest equipment** repair requirements are identified and prepared. 1.2 **Workplace information sources are applied** 1.3 ***OHS requirements*** and ***Personal Protective Equipment*** needs are applied throughout work. 1.4 Characteristics and components of post-harvest technologies are identified 1.5 Procedures and information such as maintenance manuals, tooling, equipment and ***materials*** are prepared. 1.6 Repair method options are analysed and those most appropriate to the work are selected and prepared. 1.7 Technical and/or calibration requirements are sourced for inspecting post harvesting equipment and support equipment is identified and prepared. 1.8 Warnings are observed in relation to working with post harvesting equipment.
2. Conduct inspection and analyse results	2.1 Inspection ***methods*** are implemented. 2.2 Inspection results are compared with manufacturer specifications. 2.3 Results and documents are reported with evidence, supporting information and recommendation(s).
3. Service and repair post-harvesting equipment	3.1 Maintenance procedures are applied according to manual instruction 3.2 Tools and materials requirement is prepared, and applied for service and repair. 3.3 Adjustments are made according to the specification 3.4 Techniques are implemented for service and repair in accordance with workplace procedures. 3.5 Final inspection is made to ensure maintenance is to workplace expectations.
4. Complete post-harvest equipment maintenance	4.1 Service/repairs schedule documentation is completed. 4.2 Equipment is cleaned for use or storage to workplace expectations. 4.3 Job card is processed in accordance with workplace procedures.

Variable	Range
Post-harvest equipment	May include but not limited to: • Maize Sheller • Threshers • Dehuller • decorticator • Hermetic bags/Mechanical silo • Transportation carts • Cold storage, • Par boiler • Peeling machine • Chopper • Crusher, extractor • Driers • Grain cleaner and grader • On/off grain cleaning and processing equipment
Materials	May include but not limited to: • Lubricants • Fluids • Cleaning materials • Flued container
Methods	May include but not limited to • Visual (damage, corrosion and wear) • Functional diagnosing, • Electrical devices inspection
Safe operating procedures	May include but not limited to: • The conduct of operational risk assessment and treatments associated with • machine movement and operation, • hazardous substances, • electrical safety, • working in proximity to others and site visitors
Emergency procedures	May include but not limited to: • Emergency shutdown and stopping of equipment, operating safely in the event of fires, enterprise first aid requirements and site evacuation
System component	For inspection and service may include but not limited to: • Feeding mechanism, • Grapping and loading mechanism, • Threshing mechanism, • Cleaning mechanism.

	• De hulling and polishing mechanism • Preservation mechanism • Transport and handling mechanism • Crushing and extraction • Parboiling
Environmental requirements	May include but not limited to • Waste management, • Noise, • Dust and • Clean-up management
Quality requirements	May include but not limited to: • Regulations, including International Standards, internal company quality policy and standards and enterprise operations and procedures

Evidence Guide	
Critical Aspects of Competence	Must demonstrate skills and knowledge competence in: ➢ Applying safety procedures and requirements ➢ Communicating effectively with others involved in or affected by the work ➢ Selecting methods and techniques appropriate to service operation ➢ Completing inspection, servicing, repair and preparing of post harvesting equipment for operations ➢ Accurate interpretation of inspection results ➢ Post-harvesting machinery serviceand repair ➢ Reporting and documenting
Required Knowledge and Attitudes	Demonstrate knowledge of: • OHS and environmental regulations/requirements, equipment, material and personal safety requirements applied. • Accidents of working with post-harvesting equipmentsare implemented • Operating principles of mechanical and hydraulic systems and their relationship to each other • Types post-harvest equipment and machines • Use of service/repair manuals • Inspection procedures • Service procedures • Enterprise quality procedures • Work organisation and planning processes
Required Skills	Demonstrate skills to: • Interpret and apply manufacturer/component supplier procedures,

	workplace policies and procedures • Apply analytical skills required for identification and analysis of technical information • Repair and service post-harvest equipment and machineries • Establish safe and effective work processes to resolve problems and downtime, • Develop solutions to avoid or minimise reworking and avoid wastage • Calculate material requirements and establish quality checks • Use workplace technology related to the inspection and servicing • The reporting/documenting of results
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level III	
Unit Title	**Service and Repair Chemical Spraying Machinery and Equipment**
Unit Code	**AGR MEM3 09 0322**
Unit Descriptor	This unit of competence covers the service required to apply for chemical spraying maintenance, Prepare machinery and Equipment for use, Prepare chemical mixes, Perform Chemical spraying Operation and complete Spraying preparation.

Elements	Performance Criteria
1. Prepare chemical sprayer for service and repair	1.1 Prepare a basic service application according to workshop procedures 1.2 Types of spraying equipment, components, and working principles are identified 1.3 Potential ***Occupational Health and Safety (OHS) hazards*** are identified and followed**.** 1.4 Spray equipment is identified for chemical and fertilizer application according to company procedure 1.5 Identify health and safety hazards, risks and controls procedures for selected chemical application operation 1.6 Tools and ***equipment*** required for calibrations are prepared 1.7 The requirement for chemical usage is identified according to chemical label instructions
2. Conduct spray machinery and Equipment maintenance	2.1 ***Pre-operational inspection and checks*** of chemical application equipment carried out and confirmed 2.2 Servicing and maintaining ***spraying machinery and equipment*** are implemented 2.3 Damaged or worn components are replaced. 2.4 Spraying equipment is calibrated in accordance with manufacturers' procedure to meet the desired application rate 2.5 Potential environmental impacts are identified and reported. 2.6 ***Spray components*** are checked for correct operation. 2.7 Machinery performance and efficiency are monitored and adjustments made as required. 2.8 Machinery service and repair are implemented in accordance with task requirements, conditions and manufacturers

	operating guidelines.
3. Complete service and repair of Spraying machinery and equipment	4.1 Clean and decontaminate application equipment according to operator manual instructions, MSDS (Material safety data sheet) and legislative and regulatory requirements 4.2 Nozzles, valves controllers and spraying components are cleaned to prevent clog and damage 4.3 Malfunctions, faults, **emergency procedures** and irregular performance or damage are identified, tested and reported. 4.4 Reporting and documentations are implemented.

Variable	**Range**
Occupational Health and Safety (OHS) hazards	May result from but not limited to • OHS • Chemical contact, • Burn or swallowing • Working under machines not secured • Toxic substances, • Flammable materials and fire hazards, • Wrong spraying direction in relation to the wind
Equipment	May include but not limited to: • Graduated Jar • Stop watch • Calculator • Tanker • Boom sprayer • Liquid fertilizer applicator • Liquid scum spreader
Spray components	May include but not limited to: • Nozzle • Valve • Pump • Filter • Boom • Spray Tank • Mixing tank • Holder • Pressure gauge (Bar) •

Personal Protective Equipment	May include but not limited to: • Respirator • Chemical overall • Rubber Gloves • Safety shoe • Transparent Eye goggle • Plastic boot
Pre-operational checks	May include but not limited to: • Oils and water level • Tyre pressure • Couplings • Loose bolts, nuts and tightness of clamps • Wear and tear of body and components • Nozzle size , drop volume, and clogging • Hose tear and wear • Spray volume in the tank • Pump pressure, • Leakage of chemicals, oils and fuel • Corrosion on pumps and agitator systems
Safe operating procedures	May include but are not limited to: • Operational risk assessment and treatments associated with vehicular movement, toxic substances, chemical safety, machinery movement and operation, manual and mechanical lifting and shifting, • Working in proximity to others • Emergency shutdown and stopping of equipment, • Enterprise first aid requirements
Machinery and equipment	May include but are not limited to: • Hand operated sprayer (knapsack) • Motorised sprayer • Solar operated sprayer • Battery/electric operated sprayer • Foot operated (treadle pump/ • Duster and defaulter • Trailed Sprayer • Overhead sprayer/Drone/
Environmental requirements	May include but not limited to: • Waste management(disposal) • Pollution • Water source contamination • Wind drift

	• Clean-up management
Emergency procedures	May include but not limited to: • Emergency shutdown and stopping of equipment • Extinguishing fires • Enterprise first aid requirements and site evacuation

Evidence guide	
Critical aspects of competence	Demonstrate knowledge and skills to: • Identify hazards and implement safe workplace practices and procedures • Carry out servicing chemical application machinery and equipment pre-operational checks according to operation and maintenance manual • Perform service and maintenance according to specifications • identified and documented defects in chemical application machinery and equipment and operational capacity • Calibrated and set up application equipment components • Conduct pre and post operational checks • Perform fault findingand maintenance • Record work activities
Required knowledge and attitudes	Demonstrate knowledge of: • Hazards and risks associated with chemical application machinery and equipment operations • Chemical application machinery and equipment components, controls, features, technical capabilities and limitations • Manufacturer requirements and workplace requirements for: o Pre-operational checks o Machinery maintenance techniques o Planned and emergency shutdown procedures • Features and functions of chemical application equipment components, including: liquid spray; nozzles, tanks, agitation systems, pumps, filters, pressure regulation valves • Granular applicators/dusters; hoppers, flow control valves • Effects of meteorological conditions on chemical application • Legislative and regulatory requirements applicable to chemical application • Workplace procedures applicable to health and safety in the workplace for chemical application machinery and equipment operation • Environmental impacts associated with operating chemical application machinery and equipment including spray drift

	• Effect of meteorological conditions on chemical application • Equipment characteristics, technical capabilities and limitations • Basic diagnostic techniques procedures • Equipment characteristics, technical capabilities and limitations • Components and controls features and functions identification • Environmental impacts including spray drift
Required skills	Demonstrate skills of: • Conduct pre-operational checks • Calibration/set up of application components • Service and repair sprayer machinery, and equipment in a safe, efficient and controlled manner • Perform spray maintenance tasks • Attach and uncouple associated equipment • Oral communication skills to fulfil the job role as specified by the organisation
Resource implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Methods of assessment	Competence may be assessed through: • Interview / written test • Observation / demonstration with oral questioning
Context of assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level III	
Unit Title	**Overhaul Diesel Fuel Injection Pump**
Unit Code	**AGR MEM3 10 0322**
Unit Descriptor	This unit competency covers knowledge, attitude and skill the required to Prepare to undertake the overhaul of diesel fuel injection pump, test diesel fuel injection pump, Overhaul diesel fuel injection pump and complete diesel injection pump Overhaul

Elements	Performance Criteria
1. Prepare to undertake the overhaul of diesel fuel injection pump	1.1. ***OHS*** requirements, including regulatory requirements and ***personal protection*** needs are observed throughout the work 1.3. National ***Environmental Protection*** Measure for Diesel Vehicles (Guidelines) is sourced and observed throughout the work as applicable to tasks 1.4. ***Procedures*** and ***information*** such as workshop manuals, specifications and tooling, are sourced 1.5. Method options are analyzed and those most appropriate to the circumstances are selected and prepared 1.6. Technical and/or calibration requirements for the testing and overhaul of diesel fuel injection pump is sourced and support Equipment is identified and prepared 1.7. Warnings in relation to working with diesel fuels are observed
2. Test diesel fuel injection pump	2.1. ***Methods*** for conducting diesel fuel pump tests are implemented in accordance with workplace procedures and manufacturer specifications 2.2. Test results are compared with manufacturer specifications to indicate compliance or non-compliance 2.3. Results are documented with evidence and supporting information and recommendations made 2.4. Report is forwarded to appropriate persons for action in accordance with workplace procedures
3. Overhaul diesel fuel injection pump	3.1. Information is accessed and interpreted from manufacturer/ specifications 3.2. Overhaul of diesel fuel injection pump is carried out in accordance with manufacturer specifications 3.3. Injection timing is performed/adjusted 3.4. Diesel fuel injection pump overhaul is completed without causing damage to any component or system
4. complete diesel injection pump Overhaul	4.1. Work schedule documentation is completed 4.2. Final inspection is made to ensure protective guards, safety features and cowlings are in place 4.3. Final inspection is made to ensure work is to workplace expectations 4.4. Diesel injection pump components are cleaned and/or stored to

	workplace expectations 4.5. Job card is processed in accordance with workplace procedures

Variable	Range
Overhaul methods and sequences	May include but not limited to: • Overhaul methods and sequences are to include the complete dismantling of component parts, measuring and evaluation of wear, the replacement, repair, rebuilding or reconditioning of parts comparable to original parts, the assembly of parts, performance of functional testing/injection pump, nozzle/bleeding and the completion of records • Type (inline and distributor)
OHS	May include but not limited to: • OHS requirements are to be in accordance with legislation/regulations/codes of practice and enterprise safety policies and procedures. This may include protective clothing and Equipment, use of tooling and Equipment, workplace environment and safety, handling of materials, use of fire fighting Equipment, enterprise first aid, hazard control and hazardous materials and substances
Personal protective Equipment	May include but not limited to: • Personal protective Equipment is to include that prescribed under legislation/regulations/codes of practice and workplace policies and practices
Safe operating procedures	May include but not limited to: • Safe operating procedures are to include, but are not limited to the conduct of operational risk assessment and treatments associated with vehicular movement, toxic substances, electrical safety, equipment movement and operation, manual and mechanical lifting and shifting, working in proximity to others and site visitors
Emergency procedures	May include but not limited to: • Emergency procedures related to this unit are to include, but are not limited to emergency shutdown and stopping of Equipment, extinguishing fires, enterprise first aid requirements and site evacuation
Environmental requirements	May include but are not limited to: waste management, noise, dust and clean-up management
Quality requirements	May include but are not limited to: regulations, including Ethiopian Standards, internal company quality

	policy and standards and enterprise operations and procedures
Statutory/regulatory authorities	may include Federal, and State authorities administering acts, regulations and codes of practice
Tooling and Equipment	May include but not limited to: • hand tooling, • pressure testing • calibration Equipment and devices • injection pump test stand • Nozzle tester
Materials	May include but not limited to: • spare parts, • fuel • cleaning materials
Communications	May include but are not limited to: • verbal and visual instructions • fault reporting and may include site specific instructions, • written instructions, • plans or instructions related to job/task, • telephones and pagers
Information/ documents	Sources of information/documents may include: • verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches • safe work procedures related to the overhaul of diesel fuel injection systems • regulatory/legislative requirements pertaining to the automotive industry, including Ethiopian Design Rules, Environment Protection Regulations (Diesel Fuels), National Environment Protection for Diesel Vehicle Guidelines • engineer's design specifications and instructions • organisation work specifications and requirements • instructions issued by authorised enterprise or external persons

Evidence Guide	
Critical Aspects of Competence	Must demonstrate skills and knowledge in: • Observing safety procedures and requirements • Communicating effectively with others involved in or affected by the work • Selecting methods and techniques appropriate to the circumstances • Identification of the application, purpose and operation • Application of the full overhaul sequence as per the range statement relative to the qualification being sought • Interpreting the test results

	• Conducting the overhaul in accordance with workplace and manufacturer/component supplier requirements • Completing overhaul of diesel fuel system and associated components within workplace timeframes

Required Knowledge and Attitudes	Must demonstrate knowledge of: • OHS and environmental regulations/requirements, Equipment, material and personal safety requirements • National Environment Protection Measure for Diesel Vehicles • dangers of working with diesel fuel testing Equipment • operating principles of diesel fuel systems and their relationship to each other • installation and timing of diesel injection pump • types and layout of service/repair manuals • diagnostic procedures • calibration and phasing procedures • enterprise quality procedures • work organisation and planning processes
Required Skills	Must demonstrate skills to: • apply research and interpretive skills sufficient to locate, interpret and apply manufacturer/component supplier procedures, workplace policies and procedures • installation and timing of diesel injection pump • apply analytical skills required for identification and analysis of technical information • apply questioning and active listening skills for example when obtaining information from customers • apply oral communication skills sufficient to convey information and concepts to customers • apply planning and organising skills to own work activities, including making good use of time and resources, sorting out priorities and monitoring own performance • interact effectively with other persons both on a one-to-one basis and in groups, including understanding and responding to the needs of a customer and working effectively as a member of a team to achieve a shared goal • the capacity to apply problem-solving strategies in purposeful ways, both in situations where the problem and desired solution are clearly evident and in situations requiring critical thinking and a creative approach to achieve an outcome • use mathematical ideas and techniques to calculate time, assess tolerances, apply accurate measurements, calculate material requirements and establish quality checks • use workplace technology related to the overhaul of diesel fuel injection systems, including the use of specialist tooling and Equipment, measuring Equipment,

Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test / Oral Questioning • Observation / Demonstration
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level III	
Unit Title	**Apply Digital Technology in Agriculture.**
Unit Code	**AGR MEM3 11 0322**
Unit Descriptor	This unit covers the knowledge, skills and attitude required to Understand the Concept of digital technology, apply Digital technologies among rural population and recording and documentation system.

Element	Performance Criteria
1. Understand the Concept of digital technology	1.1. ***Digital technologies*** are understood to apply digital technology. 1.2. ***Importance of digital technologies*** are understood in agricultural sector 1.3. ***Role of digital technologies*** in agriculture is identified to enhance agricultural development. 1.4. ***Principles of Agricultural technology*** are identified to apply in the agricultural sector 1.5 Mobile/Smart phones and template functions are understood to collect data and use in the reporting system
2. Apply Digital technologies among rural population and farmers	2.1. Require ***tools and equipment*** are identified and coordinated to apply digital technologies 2.2. Digital technology ***infrastructures*** are identified to implement in agricultural development 2.3. Digital technology skills are developed among the rural population 2.4. Digital ***Agri-preneurial*** skill is developed for agricultural transformation. 2.5. ***Digital technology communication tools are*** used to collect data and reporting system 2.6. Digital technologies, tools and ***techniques*** are used to deliver digital education 2.7. Implementation of digital technologies is promoted to enhance productivity
3. Recording and documentation	3.1. ***Data collecting formats*** are developed based on the needs 3.2. ***Data collectionmethodologies*** are identified and selected based on the intended objectives 3.3. Collected data are organized, analyzed and interpreted based on the intended objectives 3.4. Organized, analyzed and interpreted data are documented and reported 3.5. Feedbacks are collected from the relevant stakeholders

Variable	Range
Digital technologies	May include, but not limited to: • Internet • Computer • Smart phone • Tablet • GPS • Web browser
Importance of digital technologies	May include, but not limited to: • Sharing and searching information • Collect data • Enable storage of massive information • Time saving • Cost minimizing • Data accuracy and reliability • Data centralizing and administration • Improve collaboration • Enhance creativity • Enhances work accuracy
Role of digital technologies	May include, but not limited to: • Create connectivity between operations • Facilitate communication in agricultural sectors • Globalize communication • Strengthen market linkage
Principles of Agricultural technology	May include, but not limited to: • Design with user • Understand the existing ecosystem • Design for scale • Build for sustainability • Data driving • Reuse and improve • Address privacy and security • Collaborative
tools and equipment	May include, but not limited to: • Chargers • Computer • Smart phone • Tablet • I pad • GIS • Website • Online resources • Digital programs

infrastructures	May include, but not limited to: • Telecommunications utilities • Electricity power • Server • Information and communication Technologies • Mobiles Phones • Computers systems
Agri-preneurial	May include, but not limited to: • Online marketing • Online Learning
Digital technology communication tools	May include, but not limited to: • Smart phone • Cell phone • Email • Telegram • SMS • What's APP
technique	May include, but not limited to: • Video chat • Virtual meeting • E-learning • Email • Video conference
Data collecting formats	May include, but not limited to: • Google sheet • Templates • Ex-cell • Google drive storage
Data collectionmethodologies	May include, but not limited to: • Interview • Questionnaire • Surveying • Focus group discussion (FGD) • Case study

Evidence guide	
Critical aspects of competence	Demonstrate knowledge and skills on: • Understand the basic digital technologies. • Use mobile/Smart phones and template to collect data and reporting the data • Understand the basic digital technology communication tools. • Identify the require tools and equipment to apply digital technologies • Apply digital technology

	• Understand the basic virtual meeting.
Required knowledge and attitude	Demonstrate knowledge on: • Understand the basic digital technology communication tools. • Understand the basic digital technologies. • New or upgraded technology performance • Environmental considerations • Appropriate performance evaluation.
Required skills	Demonstrate skills to: • Use Digital technology communication to collect data and report system • Use digital technologies applications • Use software applications (word processing, spread sheets, data base management • Apply skills for accessing and using spreadsheets and databases • Literacy skills for data analysis and interpretation • Determine and confirm digital technology communication tools**.**
Resources implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of assessment	Competence may be assessed through: • Interview/written test • Observation/demonstration with oral questioning
Context of assessment	Competence may be assessed in the work place or in a simulated work place setting.

NTQF LEVEL - IV

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level IV	
Unit Title	**Overhaul Engines and Associated Components**
Unit Code	**AGR MEM4 01 0322**
Unit Descriptor	This unit competence covers knowledge , attitude and skill required to check engine operation and prepare for delivery , assemble engine and components, overhaul engine components, conduct inspection and measurement works, carry out dismantling engine and sub-assemblies and prepare to carry out engine overhaul.

Elements	Performance Criteria
1. Prepare to carry out engine overhaul	1.1 ***Workplace instructions*** are used to determine job requirements, including method, process and equipment. 1.2 ***Information*** is accessed, procedures and methods are identified and appropriate ***tools, equipment*** and ***materials*** are selected for dismantling engines and sub-assemblies. 1.3 ***Safe operating procedures, Occupational Health and Safety (OHS)***and ***environmental requirements*** are observed throughout the work 1.4 Appropriate method and overhauling works are selected and prepared.

	1.5 Technical requirements for overhaul are identified and support equipment is prepared and followed 1.6 Engine is set up for dismantling using appropriate lifting equipment and avoiding fluid spillage. 1.7 Engine block and sub-assemblies are cleaned in line with appropriate environmental constraints, and positions of auxiliary equipment are recorded. 1.8 Warnings in relation to working with diesel fuels are observed.
2. Carry out dismantling engine and sub-assemblies	2.1 Dismantling procedures are interpreted from manufacturer specifications. 2.2 Covers and ancillary components are removed, cleaned and stored without causing damage to components or system according to workshop requirements. 2.3 Engine cylinder head, blocks and sub-assemblies are dismantled and laid out in a logical order 2.4 Disassembling is implemented without causing damage to components 2.5 Component parts are cleaned using appropriate cleaning agents for the type of material and kept in a logical order in preparation for evaluation.
3. Conduct inspection and measurement works	3.1 Engine cylinder head, block and sub-assembly components are inspected, measured and tested against manufacturer specifications and tolerances. 3.2 Inspection, measurement and testing are completed without causing damage to components or system. 3.3 Components are measured and compared against manufacturer specifications and tolerances 3.4 Engine cylinder head, Engine block and sub-assembly components are evaluated against measurements, tests and inspections made. 3.5 Repair requirements are identified and reported according to workplace policy and procedures. 3.6 Workplace documentation is completed and dealt with in line with inspection, measurement and testing outcomes.
4. Overhaul engine components	4.1 Information is accessed and interpreted from manufacturer specifications and repair/reclaim methods. 4.2 Perform engine block and its subassemblies honing and grinding. 4.3 Engine and its components crack and war-page repaired 4.4 Lapping and refitting operations are implemented. 4.5 Defective and warped components are replaced 4.6 Decisions are made as to serviceability and repair method of each component.

	4.7 Crankshaft grinding and connecting rod alignment serviced 4.8 Rebuild or replacement of engine components is carried out in accordance with manufacturer/component supplier specifications and tolerances. 4.9 Overhaul activities are carried out according to industry regulations/guidelines, OHS legislation and enterprise procedures/policies.
5. Assemble engine and components	5.1 Engine is assembled by following manufacturer/component supplier procedures. 5.2 Running clearances are measured against manufacturer specifications and necessary adjustments are made. 5.3 Assembly of engine is completed within established industry guidelines and timeframes. 5.4 Assembly is completed without causing damage to any component or system.
6. Check engine operation and prepare for delivery	6.1 Engine is securely mounted in preparation for starting. 6.2 Engine fluid levels, including lubrication and coolant are checked. 6.3 Gauges and warning devices are checked for operation prior to starting. 6.4 Engine is started and checked for leaks and abnormal noises. 6.5 Work schedule documentation is completed. 6.6 Engine is cleaned to workplace expectations. 6.7 Job card is processed in accordance with workplace procedures.

Variable	**Range**
Information	May include but not limited to: • Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches • Safe work procedures related to the overhaul of engines • Regulatory/legislative requirements pertaining to the industry, including Ethiopian Design Rules, Environment Protection Regulations (Diesel Fuels), National Environment Protection For Diesel Vehicle Guidelines • Engineer's design specifications and instructions • Organisation work specifications and requirements
Tool and equipment	May include but are not limited to: • Hand tooling, • Power tooling • Torque wrench • Lifting and jacking equipment • Specialist tooling

	• Valve lapper • Cylinder honing machine • Micrometre (inside, outside and depth) • Verier calliper (analogue and digital) • Oil clearance measuring device • V-block • Dial indicator • Filler gage • Inside calliper • Bore gage • Crank shaft and cam shaft grinder • Connecting rod alignment • Piston ring remover and expander • Straight edge • Valve spring compressor • Valve face angle protractor • Valve face grinder • Valve seat grinder
Materials	May include but not limited to: • Oils • Lubricants • Replacement parts • Lapping fluid • Penetrating oil • Dye penetrant • Crack detecting powder • Gaskets, sealants and cleaning materials
Safe operating procedures	May include but are not limited to: • Operational risk assessment and treatments associated with: ➢ Vehicular movement ➢ Toxic substances ➢ Electrical safety ➢ Equipment movement and operation ➢ Manual and mechanical lifting and shifting ➢ Working in proximity to others and site visitors
Occupational Health and Safety (OHS*)* requirements	Are to be in accordance with legislation/regulations/codes of practice and enterprise safety policies and procedures. This may include: • Protective clothing and equipment • Use of tooling and equipment • Workplace environment and safety • Handling of materials • Use of fire fighting equipment • Enterprise first aid • Hazard control and hazardous materials and substances
Environmental requirements	May include but are not limited to: • Waste management • Noise, dust and clean-up management

Emergency procedures	May include but not limited to: • Emergency shutdown and stopping of equipment • Extinguishing fires • Enterprise first aid requirements and site evacuation
Quality requirements	May include but are not limited to: • Regulations, including Ethiopian Standards, internal company quality policy and standards and enterprise operations and procedures
Overhaul methods and sequences	May include but not limited to: • Overhaul methods and sequences are to include: ➢ The complete dismantling of component parts, ➢ Measuring and evaluation of wear, ➢ The replacement, repair, ➢ Crack detection procedures ➢ Rebuilding or reconditioning of parts comparable to original parts, ➢ The assembly of parts, ➢ Performance of functional testing of engine, ➢ Injection pump timing, ➢ Nozzle/bleeding and the completion of records

Evidence guide	
Critical aspects of competence	Must demonstrate skills and knowledge competence in: • Apply safety procedures and requirements • Communicating effectively with others involved in or affected by the work • Selecting methods and techniques appropriate to the work • Dismantling, evaluating, assembling, adjustment, measuring and testing engines in accordance with manufacturer requirements • Completing overhaul of a range of engines and associated components within workplace guidelines and timeframes
Required knowledge and attitudes	Demonstrate knowledge of: • OHS and environmental regulations/requirements, equipment, material and personal safety requirements • Operating principles of and their relationship to each other • Types, characteristics and operating processes of engines • Identification of motor vehicle emissions and their effects on the environment • The identification of application, purpose and operation • The identification of component parts to include physical, fluid, gases and heat generation • Types and layout of service/repair manuals • Engine overhaul procedures • Dismantling, assembling and adjustment methods • Measuring and testing procedures • Relevant technical information • Component safety requirements

	• Relevant enterprise policies • Manual handling techniques
Required skills	Demonstrate skills to: • Interpret and apply manufacturer/component supplier procedures, workplace policies and procedures • Apply analytical skills required for identification and analysis of technical information • Apply good use of time and resources, sorting out priorities and monitoring own performance • Interact effectively with other persons both on a one-to-one basis and in groups, • Understand and responding to the needs of a customer and working effectively as a member of a team to achieve a shared goal • Establish safe and effective work processes to resolve problems and downtime, • overhaul of engines, including use of specialist tooling and equipment, measuring equipment, computerized technology and communication devices • Reporting/documenting of results
Resources implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Methods of assessment	Competency may be assessed through: • Interview / written test • Observation / demonstration with oral questioning
Context of assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level IV	
Unit Title	**Service and repair Power Train**
Unit Code	**AGR MEM4 02 0322**
Unit Descriptor	This unit competence covers knowledge, attitude and skill required to complete Power train repair and maintenance, carry out repair and maintenance of power train , test power train assemblies and analyse results and prepare to repair and service power train

Elements	Performance Criteria
1. Prepare to repair and service power train	1.1 ***OHS requirements***, including regulatory requirements and Personal Protective Equipment needs are observed throughout the work. 1.2 Procedures and ***information*** are sourced such as workshop manuals, specifications and tooling. 1.3 Overhaul method options are analysed and those most appropriate to the circumstances are selected and prepared 1.4 Technical and/or calibration requirements are identified and prepared for the testing. 1.5 ***Tools, equipment and materials*** required repairing and service power trains are identified and prepared. 1.6 Warnings are observed in relation to working with gear, chain and tracked type assemblies. 1.7 Warnings are observed in relation to working with stored energy as in emergency braking actuators. 1.8 Dangers working are observed with brake dust and preventative measures.
2. Test power train assemblies and analyse results	2.1 Methods for the conduct of the system tests are implemented in accordance with workplace procedures and manufacturer/component supplier specifications 2.2 Observations are noted during the test 2.3 Power train assemblies' faults are identified and tested. 2.4 Results of test are analysed 2.5 Results are compared with manufacturer specifications to indicate compliance or non-compliance 2.6 Results are documented with evidence and supporting information and recommendation(s) made 2.7 Report is processed in accordance with workplace procedures

3. Carry out repair and maintenance of power train	3.1 Methods for the conduct of the service and overhaul are implemented in accordance with workplace procedures and manufacturer/component supplier specifications 3.2 Carry out repair and maintenance of power train assemblies (from clutch up to final drive axle) 3.3 All adjustments are made during the overhaul in accordance with manufacturer specifications 3.4 Methods for the conduct of the test are implemented in accordance with workplace procedures and manufacturer specifications. 3.5 Replacements to faulty power train systems components are carried out in accordance with manufacturer specifications for methods, equipment and tolerances. 3.6 All power train and associated components are repaired without causing damage to any component or system. 3.7 Power train parts are cleaned in readiness for evaluation 3.8 Parts are checked for serviceability against manufacturer specifications 3.9 ***Safe operating procedures*** are observed and noted during the use of tools/ equipment in accordance with workplace guidelines 3.10 Emergency procedures are identified and followed as per organization's guideline 3.11 Environmental requirements are observed and precautions implemented according to workplace and environmental protection regulation or guidelines 3.12
4. Complete Power train repair and maintenance	4.1 Over all schedule documentation is completed. 4.2 Power train components are reassembled and cleaned to enterprise requirements 4.3 Inspection is made to ensure safety features are in place. 4.4 Final inspection is made to ensure work is to workplace expectations. 4.5 Final road testing is implemented 4.6 Power Train components is cleaned and presented for use or stored to workplace expectations. 4.7 Job card is processed in accordance with work done procedures.

Variable	**Range**

OHS requirements	May include but not limited to: • Protective clothing and equipment, • Use of tooling and equipment, • Workplace environment and safety, • Handling of materials, • Use of fire fighting equipment, • Enterprise first aid, • Hazard control and hazardous materials and substances
Information	May include but not limited to: • Verbal or written and graphical instructions • Signage, work schedules/plans/specifications • Work bulletins, memos, material safety data sheets • Diagrams or sketches • Safe work procedures related to the overhaul of final drive assemblies • Regulatory/legislative requirements pertaining to the automotive industry, including Ethiopian Design Rules • Engineer's design specifications and instructions • Organisation work specifications and requirements • Instructions issued by authorised enterprise or external persons
Tools and equipment	May include but not limited to: • Hand tools, • Special tool for disassembly • Measuring equipment • Lifting equipment • Cleaning equipment • Testing equipment, including load device and tachometers, multi meters, meters, and power tooling etc.
Materials	May include but not limited to: • Lubricants, • spare parts • cleaning materials
Safe operating procedures	May include but not limited to: • Safe operating procedures are to include, but are not limited to the conduct of operational risk assessment and treatments associated with: ➢ Toxic substances ➢ Electrical safety ➢ Power train moving parts ➢ Equipment movement and operation ➢ Manual and mechanical lifting and shifting ➢ Working in proximity to others and site visitors
Emergency procedures	May include but not limited to: • Emergency procedures related to this unit are to include but are not limited to: ➢ Emergency shutdown and stopping of equipment ➢ Extinguishing fires ➢ Enterprise first aid requirements and site evacuation
Environmental requirements	May include but not limited to: • Waste management • Noise, dust and clean-up management

Power train components	May include but not limited to: • Clutch system(dry and wet) • Gearbox • Transfer case • Propeller shaft • Universal joint (Spider kit) • Differential • Axel and axel housing
Quality requirements	May include but not limited to: • Regulations, including Ethiopian Standards, internal company quality policy and standards and enterprise operations and procedures

Evidence guide	
Critical aspects of competence	Must demonstrate skills and knowledge competence in: • Apply safety procedures and requirements • Communicating effectively with others involved in or affected by the work • Selecting methods and techniques appropriate to the circumstances • Completing preparatory activity in a systematic manner • Identification of the application, purpose and operation • Application of the full repair maintenance and overhaul sequence as per the range statement relative to the qualification being sought • Presenting and interpreting the test results • Conducting the overhaul power train in accordance with workplace and manufacturer requirements • Presentation of vehicle/machinery to customer in compliance with workplace requirements
Required knowledge and attitudes	Demonstrate knowledge of: • OHS and environmental regulations/requirements, equipment, material and personal safety requirements • Dangers of working with wheeled and tracked type vehicles and equipment • Identification of the power train application, purpose and operation • Identification of component parts to include physical, fluid, gases and heat generation • Analytical knowledge of gear ratio • Identification of wear evaluation methods • Operating principles power train systems and their components, including air compressors • Types and layout of service/repair manuals • Manual transmission overhaul procedures • Component repair and adjustment procedures • Manual handling procedures • Types and layout of service/repair manuals • Clutch assembly test procedures • Manual transmission dismantling and assembling procedures • Differential, final drive assembly test ,repair procedures

	• work quality procedures • Service manual handling procedures
Required skills	Demonstrate skills to: • Interpret and apply manufacturer/component supplier procedures, workplace policies and procedures • Apply analytical skills required for identification and analysis of technical information • Apply planning and organising skills to own work activities, including making good use of time and resources, sorting out priorities and monitoring own performance • Interact effectively with other persons both on a one-to-one basis and in groups • Repair and maintain power train assembly • Identify and test faults for power train system components • Apply workplace technology related to the repair of for dry and wet clutchassemblies • Reporting/documenting of results.
Resources implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Methods of assessment	Competency may be assessed through: • Interview / written test • Observation / demonstration with oral questioning
Context of assessment	Competency may be assessed in the work place or in a simulated work place setting

Occupational standard: Agricultural Machinery and Equipment Maintenance Level IV	
Unit Title	**Repair Automatic Transmissions System**
Unit Code	**AGR MEM4 03 0322**
Unit Descriptor	This unit covers the competence required to carry out the inspection, testing and repair of automatic and semi-automatic transmissions and associated components.

Elements	Performance Criteria
1. Prepare to inspect and test automatic transmission	1.1 **Workplace *information*** sources and procedures are identified and prepared 1.2 ***OHS requirements*** and ***Personal Protective Equipment*** needs are applied throughout the work. 1.3 ***Method*** options for ***faults*** identification are selected and prepared 1.4 Types and characteristics of ***automatic transmission system*** are identified. 1.5 Technical and/or calibration requirements are applied for testing of transmissions. 1.6 ***Tools, equipment*** and ***materials*** are identified and prepared 1.7 Warnings are identified in relation to working with semi-automatic, automatic transmissions.
2. Inspect and test automatic transmission and analyse results	2.1 Methods for system faults inspection are implemented. 2.2 Methods for system tests are implemented. 2.3 Road/site test is conducted to identify transmission operational abnormalities. 2.4 Results are compared with manufacturer specifications. 2.5 Results are documented with evidence and supporting information and recommendation(s) made. 2.6 Report is processed in accordance with workplace procedures.
3. Carry out removal and repair	3.1 Procedures and information for repairing transmission are applied. 3.2 Technical and tool requirements for repair are applied. 3.3 ***Repair methods*** and sequence for removal and repair ***transmission*** are implemented. 3.4 Adjustments are made during the removal and repair in accordance with manufacturer specifications and quality requirements. 3.5 Automatic transmission system components are reassembled
4. Complete Repair and service automatic transmission	4.1 Repair and/or replacement schedule documentation is completed 4.2 Final inspection is made to ensure work is to workplace expectations.

	4.3 Final inspection is made to ensure protective guards, safety features are in place. 4.4 Automatic transmission parts are cleaned for use or storage to workplace expectations. 4.5 Job card is processed in accordance with workplace procedures.

Variable	**Range**
Specific requirements	May include but not limited to • Power take off assemblies • Multiple forward and reverse gears • Multi countershaft • Torque converter • Planetary gear assembly • Transverse/longitudinal mounting • Transfer case
Information sources	May include but not limited to: • Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches • Safe work procedures related to repair, removal and replacement of manual transmissions and/or associated components • Regulatory/legislative requirements pertaining to automotive industry, including International design Rules • Engineer's design specifications and instructions • Organization work specifications and requirements • Instructions issued by authorized enterprise or external persons • International standards
OHS requirements	May include but not limited to • Protective clothing and equipment • Use of tools and equipment • Workplace environment and safety • Handling of material • Use of fire fighting equipment • Enterprise first aid • Hazard control and hazardous materials and substances
Method	May include but not limited to • Operational testing, testing under operating conditions, test bench testing • Visual, functional assessment (including fluid leakage, speed and range selection, wear, damage, corrosion, Open circuits)
Faults	May include but not limited to: • noisy operation • jumping out of gear • external oil leaks • loss of power

	• electrical faults
Tools and equipment	May include, but are not limited: • Hand tools, • meters, • load testing devices • electrical testing equipment
Materials	May include but not limited to: • Fluids, • spare parts • cleaning materials
Safe operating procedures	May include, but are not limited to: • Operational risk assessment and treatments associated with vehicular movement, toxic substances, electrical safety, equipment movement and operation, manual and mechanical lifting and shifting, working in proximity to others and site visitors
Automatic transmission	May include but not limited to • Automatic and semi -automatic transmissions power shift, • Power take off assemblies • Pre-selective transmissions • Electronically controlled transmissions • Continuous Variable transmission (CVT)
Emergency procedures	May include, but are not limited to: • Emergency shutdown and stopping of equipment • Extinguishing fires • Enterprise first aid requirements and site evacuation
Environmental requirements	May include, but not limited to: • Waste management • Noise • Dust and clean-up management

Evidence Guide	
Critical Aspects of Competence	Must demonstrate skills and knowledge in: • Applying safety procedures and requirements • Communicating effectively with others involved in or affected by the work • Selecting methods and techniques, appropriate to the work. • Completing preparatory activity in a systematic manner • Interpreting testing results • Identify automatic transmission oil • Identification of application, purpose and operation of automatic transmission • Conducting repairs in accordance with workplace and manufacturer requirements • Completing repair of transmissions and associated components within workplace timeframes.

Required Knowledge and Attitudes	Demonstrate knowledge of: • OHS regulations/requirements, equipment, material and personal safety requirements • Dangers of working with transmissions • Operating principles of automatic and semi-automatic transmissions and their relationship to other systems • Types and layout of service/repair manual (hard copy and electronic) • Diagnostic procedures • Repair and/or replacement procedures • Work quality procedures • The identification of application, purpose and operation
Required Skills	Demonstrate skills to: • Interpret and apply manufacturer/component supplier procedures, workplace policies and procedures • Apply analytical skills for identification and analysis of technical information • Apply effective operational test • Repair and service automatic transmission system components • Establish safe and effective work processes which anticipate and/or resolve problems and downtime. • Use workplace technology, including the use of measuring equipment, computerized technology and communication devices and the documenting/recording of results
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational standard: Agricultural Machinery and Equipment Maintenance Level III	
Unit Title	**Service and Repair Electronically Controlled Management Systems**
Unit Code	**AGR MEM4 04 0322**
Unit Descriptor	This unit covers the competence knowledge , attitude and skill to service and repair Electronically controlled parts management systems and associated components.

Elements	Performance Criteria
1. Prepare for work	1.1 Work instructions and ***information*** sources are used to determine job requirements, including ***faults finding method***, process and equipment. 1.2 ***OHS requirements***, including ***Personal Protective Equipment*** are observed throughout the work 1.3 Job specifications are read and interpreted. 1.4 Electronic system protection devices, processes and precautions appropriate to application are identified. 1.5 Equipment, tooling and materials are identified and checked for safe and effective operation. 1.6 Procedures are determined to minimize task time.
2. Apply diagnostic tool to identify fault(s)	2.1 Diagnosis strategy that can be used to determine a fault is applied. 2.2 Findings are confirmed by diagnosing methods**.** 2.3 Faults are diagnosed without causing damage to workplace property, component or equipment. 2.4 Report of findings is documented. 2.5 Inspections are carried out according to industry regulations/ guidelines.
3. Service and repair Electronically controlled management systems	3.1 Correct information is accessed and interpreted from manufacturer specifications. 3.2 Electrical and electronic components are cleaned. 3.3 Tests on ***electronically controlled parts management systems*** are carried out to determine faults using tooling, equipment and techniques. 3.4 Service and repairs, component replacement and adjustments are carried out using tooling, techniques and materials. 3.5 Service and repairs are completed without causing damage to component or system. 3.6 Service and repairs are carried out according to industry regulations/guidelines.

4. Complete Repair and Service of Electrical and Electronic controlled systems	4.1 ***Environmental requirements*** are observed and precautions implemented according to workplace and environmental protection regulation or guidelines. 4.2 Waste and scrap are removed following workplace procedure. 4.3 Equipment and work area are cleaned and inspected for serviceable condition in accordance with workplace procedures. 4.4 Unserviceable equipment is tagged and faults are identified in accordance with workplace requirements. 4.5 Maintenance is completed in accordance with manufacturer specifications 4.6 Tools and equipment are maintained and cleaned in accordance with workplace procedures.

Variable	**Range**
Information	May include but not limited to: • Verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches • Safe work procedures related to the service and repair of electronic compression ignition engine management systems • Regulatory/legislative requirements pertaining to automotive industry, including International design Rules and National Environmental Protection Measure for diesel vehicles • Engineer's design specifications and instructions • Organization work specifications and requirements • Instructions issued by authorized enterprise or external persons • International standards
Fault finding methods	May include but not limited to: • Visual and identification and testing • Component/equipment performance comparison • indoor and outdoor diagnosis • using electrical and electronic diagnosis tools • Retrieval and assessment of electronic systems data, such as fault codes • Diagnosis and determining faults, including interpretation of exhaust emissions • Pre- and post-repair testing of system and component operation
Faults	May include but not limited to: • Engine will not start, • Engine misfiring • Poor engine performance • Component malfunction, • Open and short circuits • Incorrect information • Automatic transmission lock • Door lock

	• Brake failure • Fault on input sensors, output actuators, wiring harness, computer systems, calibration/adjustment specifications, component specifications, component assembly, component damage and system modifications.
OHS requirements	Are to be in accordance with legislation/regulations/codes of practice and enterprise safety policies and procedures and may include: • Protective clothing and equipment, • Use of tooling and equipment, • Workplace environment and safety, • Handling of material, • Use of firefighting equipment, • Enterprise first aid, • Hazard control and hazardous materials and substances
Tools and equipment	May include: • Hand tools • Testing equipment, including: ➢ Multi meters ➢ Exhaust gas analyzer ➢ OBD tools ➢ Oscilloscope ➢ Vacuum gauge, ➢ Pressure gauge ➢ Tachometer ➢ Vehicle lifting equipment ➢ Power tooling, air tooling ➢ Specialist tooling for removal/adjustment ➢ Scan tooling ➢ LED test light and injector testing equipment ➢ Computer software, computer hardware, specific tooling ➢ Equipment used for dismantling, testing and diagnosis,
Materials	May include: • Spare parts • cleaning material
Safe operating procedures	May include but are not limited to: • The conduct of operational risk assessment and treatments associated with: ➢ Electrical safety ➢ Equipment movement and operation ➢ Manual and mechanical lifting and shifting ➢ Working in proximity to others and site visitors
Testing equipment	May include but not limited to : • Engine analyser • Power balance tester • Computer-based diagnostic system • Timing lights, • Hand and power tooling

Electronically controlled management systems	May Include but not limited to: • Engine management systems are systems where the ECU incorporates control over both fuel injection and timing control systems • Electronically controlled automatic power train transmission • Electronically controlled anti-locking braking systems, PTO, and hydraulic system • Engine immobilization, central locking, power windows, electric mirrors, electronic seat adjustment with memory and security systems • Electronically controlled suspension and steering • Electronically operated traction control systems
Emergency procedures	May include but are not limited to: • Emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation
Environmental requirements	May include but are not limited to: • Waste management, noise, dust and clean-up management

Evidence guide	
Critical aspects of competence	Demonstrate knowledge and skills to: • Apply safety procedures and requirements, including those for high-pressure diesel systems • Communicating effectively with others involved in or affected by the work • Selecting methods and techniques appropriate to the circumstances • Conduct diagnosis of fault(s) and interpret results • Diagnosis carried out to manufacturer requirements • Testing electronic engine management systems and identifying faults • Determining the repair/replacement/adjustment requirements to rectify faults • Servicing/repairing/adjusting electronically controlled parts management systems to workplace and manufacturer/component supplier requirements
Required knowledge and attitudes	Demonstrate knowledge of: • OHS regulations/requirements, equipment, material and personal safety requirements • Operating principles of electronically controlled parts management systems /components • Operation of electronically controlled parts management systems /components relevant to application • Relationship to other electronically controlled systems, including shared components (e.g. Ecu, sensors) • Test, diagnosis and fault determination procedures • Service/repair, removal, replacement and adjustment procedures of electronically controlled parts management Systems management systems • work quality processes

Required skills	Demonstrate skills to: • Collect, organize and understand information related to work orders, plans and safety procedures for servicing and repairing electronically controlled parts management systems • Communicate ideas and information to enable confirmation of work requirements and specifications, coordination of work with site supervisor, • Plan and organize activities, including preparation and layout of worksite and obtaining of equipment and material to avoid backtracking or workflow interruptions • Work with others and in a team by recognizing dependencies and using cooperative approaches to optimize workflow and productivity • Apply diagnostic tool to rectify faults • Service and maintain electrical and electronic control systems • Establish safe work processes to resolve problems and downtime • Systematically develop solutions to avoid or minimize reworking and avoid wastage • Apply workplace technology related to the service and repair of electronic management systems, • The reporting/documenting of results
Resources implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Methods of assessment	Competency may be accessed through: • Interview / written test • Observation / demonstration with oral questioning
Context of assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level IV	
Unit Title	**Manage Workshop Operational Activities**
Unit Code	**AGR MEM4 05 0322**
Unit Descriptor	This unit describes the performance outcomes, skills and knowledge required to develop and monitor implementation of the operational work shop plan to provide efficient and effective workplace practices within the organisation's productivity and profitability plans operational plans may be developed by a strategic planning.

Elements	Performance Criteria
1.Develop operational plan	1.1 ***Required resource*** are identified and selected to develop operational plan 1.2 Appropriate methods of implementation are identified 1.3 Details of the operational plan that include the development of ***key performance indicators (KPI)*** are ensured to measure organizational performance. 1.4 Organisation commitment to sustainability is developed as an integral part of the business planning and as a business opportunity 1.5 The development and presentation of proposals for resource requirements are supported by a variety of information sources and specialist advice is sought as required. 1.6 Approval for plan is obtained from relevant parties and ensures understanding among work teams involved.
2.Manage workshop resource	2.1 Strategies are developed and implemented to ensure that employees are recruited and/or inducted within the organisation's human resources management policies and practices. 2.2 Rules and regulations are implemented to avoid, minimize and eliminated resource wastage 2.3 Resource are managed efficiently according enterprise requirement 2.4 Record systems are established for tracking continuous improvements in organization 2.5 Internal and external feedbacks are collected, documented and reported to concerned body
3. Monitor and review work shop performance	3.1 Monitor and review the progress in achieving expected outcome of the organization. 3.2 Budget and actual financial information are analysed and interpreted to monitor and review outcomes 3.3 Areas of underperformance, recommend solutions are identified and prompt action is taken to rectify the situation. 3.4 Systems are planned and implemented to ensure that mentoring to support individuals and teams to effectively, economically and safely use resources.

	3.5 Outcomes are recorded and feedback is provided to key personnel and stakeholders. 3.6 Performance of achievement is compared and analysed with operational plan and efficiency improvements measures are applied 3.7 Systems are developed and implemented to ensure that procedures and records associated with documenting performance are managed in accordance with organisational policies**,** ***information and procedures.***

Variable	**Range**
Required resource	May include but not limited to : • Spare parts • Lubricants, • Financial resources • Human Resources • Material • Workshop tools • Machinery • Equipment
Key Performance Indicators	May include but not limited to : • Cost reduction • Failure minimization • Reduce Downtime • Effective work schedule
Failure analysis and evaluation process	May include but not limited to : • poor selection, incorrect fitting, overloading, overpowering) • propeller selection (size, pitch, material and application) • farm machineries and equipment's faults • The objective of the failure analysis and evaluation process may be to determine fault rectification measures, to effect variation in system characteristics and parameters or to enhance system performance.
Information and procedures	May include but not limited to: • Workplace procedures relating to the use of tooling and equipment • Workplace procedures relating to reporting and communication • Manufacturer/component supplier specifications and application procedures for testing equipment and materials • Manufacturer/component supplier specifications, schematics and operational procedures related to farm machineries and equipment's installation guidelines • Farm machineries and equipment's industry legislation/regulations • Farm machineries and equipment's industry publications related to farm machineries and equipment system technology and technology changes

Evidence guide	
Critical aspects of competence	Must demonstrate skills and knowledge to : • Identify appropriate methods of implementation • Prepare operational plan • Compare and analyse performance with achievement • Manage resource efficiently • Analysed and interpreted budget and actual financial information • Document work shop information • Implementrules and regulations to avoid, minimize and eliminated resource wastage
Required knowledge and attitudes	Must demonstrate knowledge of: • Prepare operational plan • Implement rules and regulations to avoid, minimize and eliminated resource wastage • Manage resource efficiently • Work shop management system • Performance measures (KPI) • Procedures of job order • Safe working procedures
Required skills	Must demonstrate skills to: • Identify appropriate methods of implementation • Prepare operational plan • Manage resource efficiently • Implement rules and regulations to avoid, minimize and eliminated resource wastage • Plan is obtained from relevant parties and ensures understanding among work teams involved. • Collect, document and report internal and external feedbacks
Resource implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Methods of assessment	Competency may be assessed through: • Interview / written test • Observation / demonstration with oral questioning
Context of assessment	Competency may be assessed in the work place or in a simulated work place setting

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level IV	
Unit Title	**Analyse and Evaluate Farm machineries and equipment Performance**
Unit Code	**AGR MEM4 06 0322**
Unit Descriptor	This unit covers the competence to analyse and evaluate farm machineries and equipment in order to initiate action to sustain, vary or enhance performances. It competence includes identify and confirm the work requirement, prepare for analysis and evaluation of farm machinery and equipment, apply the analysis and evaluative methodology, select response measure and restore machineries and equipment in the workplace.

Elements	Performance Criteria
1. Prepare for machinery performance evaluation	1.1 Nature and objective of the **failure *analysis and evaluation process*** requirements are determined. 1.2 Benchmark specifications are accessed and interpreted for correctly functioning farm machineries and equipment's performance systems. 1.3 OHS requirements are observed and utilized. 1.4 ***Personal protection*** needs implemented throughout the work. 1.5 Effects of systemic deficiencies/discrepancies or faults are identified and confirmed from indirect and/or direct evidence. 1.6 Possible safety impacts of the work are considered and responded. 1.7 ***Evaluative criteria*** are developed/ adopted to meet the objective of the work. 1.8 Analytical and evaluative including diagnostic process, sequence and tests and testing equipment methodology are developed and/or identified and are selected from the range of available options. 1.9 Testing equipment is obtained and prepared. 1.10 Tools, materials and equipment required are identified, selected and prepared for use to support the diagnostic process. 1.11 Farm machineries performance system components are prepared for the diagnostic process, including park-up, isolation procedures and cleaning requirements.
2. Apply Evaluation and Analysis Methodology	2.1 Selected analytical and diagnostic process is applied. 2.2 ***Tests*** and ***testing equipment*** are applied as per standard. 2.3 Analytical and other diagnostic findings are verified and documented 2.4 Analytical findings and results are evaluated against the agreed criteria.

	2.5 Valid conclusions are drawn from the available evidence and documented to enterprise requirements. 2.6 Information and details related to the analysis and evaluation are provided to the appropriate work in accordance with regulatory and commercial obligations.
3. Select response measure	3.1 Options for responding to measure are identified from further research of technical support ***information and procedures***. 3.2 A response option is selected from an analysis of the options, prevailing circumstance, confidentiality, regulatory requirements and commercial policies. 3.3 Selected response option is documented and reported .
4. Restore the workplace	4.1 Materials that can be reused are collected and stored. 4.2 Testing equipment and other support materials are cleaned, maintained and prepared ready for further use or stored. 4.3 Waste and scrap are removed following workplace procedures. 4.4 Equipment and work area are cleaned inaccordance with workplace procedures.

Variable	**Range**
Failure analysis and evaluation process	May include but not limited to : • poor selection, incorrect fitting, overloading, overpowering) • propeller selection (size, pitch, material and application) • farm machineries and equipment's faults • The objective of the failure analysis and evaluation process may be to determine fault rectification measures, to effect variation in system characteristics and parameters or to enhance system performance.
Evaluative criteria	May include but not limited to : • Specification • Standard test code • Efficiency
Tests	May include but not limited to : • Engine performance, fuel and oil consumption. • Farm machineries and equipment performance, • Work rate(in field operation) • Efficiency • Noise test • Stability test • \
Testing equipment	May include but not limited to : • Dynamometer • Compression gauges • Engine analyser • Power balance tester • Computer-based diagnostic system

	• Tape measure, • Tachometer • Timing lights, • Torque gauges
Information and procedures	May include but not limited to: • Workplace procedures relating to the use of tooling and equipment • Workplace procedures relating to reporting and communication • Manufacturer/component supplier specifications and application procedures for testing equipment and materials • Manufacturer/component supplier specifications, schematics and operational procedures related to farm machineries and equipment's installation guidelines • Farm machineries and equipment's industry legislation/regulations • Farm machineries and equipment's industry publications related to farm machineries and equipment system technology and technology changes

Evidence guide	
Critical aspects of competence	Must demonstrate skills and knowledge to: • Interpret work order and locate and apply information • Apply safety requirements, including the isolation of equipment and use of personal protective equipment • Follow work instructions, operating procedures and inspection processes to: ➢ Minimise the risk of injury to self and others ➢ Prevent damage and wastage of materials, equipment and products ➢ Maintain required production output and product quality • Evaluate performance and analyse the result • Evaluate, select and document the most appropriate rectification measure • Analyse and validate or recommend variations for different farm machineries and equipment performance systems • Document and report the diagnostic process and findings and recommended rectification • Modify activities to cater for variations in workplace context and environment
Required knowledge and attitudes	Must demonstrate knowledge of: • Farm machineries and equipment performance test methods and techniques • Farm machineries and equipment performance and design characteristics • Theory of diagnosis, including concept, design and planning • Types, functions and operations of testing equipment • Farm machineries and equipment digital computing systems • Methods and processes for documenting and reporting diagnostic findings and recommendations

Required skills	Must demonstrate skills to: • Organise and apply technical information related to contemporary farm machineries and equipment performance systems, monitoring and testing processes, diagnostic methods and options and safety procedures • Communicate ideas and information to enable confirmation of work requirements and specifications, coordination of work with site supervisor, • Plan and organise activities, including the planning of analytical processes, • Establish evaluative (success) criteria, preparation and layout of the worksite and the obtaining of testing equipment and materials to avoid backtracking, workflow interruptions or wastage • Work with others and in a team • Apply mathematical ideas and techniques to complete measurements, calculate analytical requirements, calibrate, adjust and establish testing equipment • Establish analytical processes, including diagnostic processes, cater for both direct and indirect evidence, avoid or minimise reworking and avoid wastage • Use the workplace technology related to systems analysis and diagnosis, information research and management systems, • Testing equipment, maintenance equipment, tooling, calculators and measuring devices.
Resource implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of assessment	Competency may be assessed through: • Interview / written test • Observation / demonstration with oral questioning
Context of assessment	Competency may be assessed in the work place or in a simulated work place setting

Occupational Standard: Agricultural Machinery and Equipment Maintenance Level IV	
Unit Title	**Estimate Agricultural Machinery Repair and Maintenance Cost**
Unit Code	**AGR MEM07 0322**
Unit Descriptor	This unit of competency describes the skills and knowledge required to estimate and calculate the costs to repair, maintain or modify a vehicle taking into account materials, labour and overhead costs. It requires the ability to estimate and calculate costs, analyse information, and report and document the costs.

Elements	Performance Criteria
1. Gather information	1.1 The particular service is clarified as required. 1.2 Details of the proposed ***service requirements*** are obtained and analysed. 1.3 Labour and materials unit cost projections are obtained. 1.4 Logistic support contracts, supply agreements or equivalent are obtained and analysed. 1.5 Details of storing/warehousing cost and physical distribution systems and related cost factors are obtained. 1.6 ***Information/documents*** ready for retrieval and application are documented and stored.
2. Determine and calculate materials, labour and overheads	2.1 Cost of repair time is estimated. 2.2 Labour requirements is estimated for direct services and related operations. 2.3 Cost of subcontractor work is estimated. 2.4 Type and cost of parts and materials are estimated according to industry and enterprise pricing standards. 2.5 Final estimate is documented. 2.6 Components contributing to ***overhead costs*** are determined. 2.7 Overhead costs are calculated to be attributed to the work in accordance with enterprise procedures.
3. Estimate costs	3.1 Repair time is costed in accordance with enterprise procedures. 3.2 Direct labour costs and subcontractor work are costed. 3.3 Parts and materials are costed. 3.4 Total job cost, including overheads and mark-up percentages are calculated in accordance with enterprise procedures. 3.5 Total service cost is calculated. 3.6 Potential quotation variations are noted. 3.7 Cost calculations are recorded.

4. Document and verify details	4.1 Details of costs and charges are documented in accordance with enterprise procedures. 4.2 Costs, calculations and other details are verified with relevant enterprise person. 4.3 Details are documented and filed for future reference and in accordance with organizational policies and procedures.

Variable	**Range**
Service requirements	May include but not limited to: • Seasonal maintenance • Preventative maintenance • Subcontracting • Replacement parts • Repair within timeframe Are to be in accordance with applicable legislation and regulations, and organizational safety policies and procedures, and may include: • Personal protective equipment and clothing • Safety requirement • First aid equipment • Hazard and risk control • Elimination of hazardous materials and substances • Manual handling, including shifting, lifting and carrying • Emergency procedures • Road rules • Safe driving policy • Waste management • Noise • Dust • Clean-up management
Information/ documents	May include but not limited to : • Insurance and Repair Industry Code of Conduct • Verbal, written and graphical instructions • Parts listing prices and catalogues • Inventory systems • Material Safety Data Sheets (MSDS) • Diagrams or sketches • Safe work procedures for inspection of machineries. • Engineer's design specifications and instructions • Workplace specifications and requirements • Instructions issued by authorised enterprise or external persons • Ethiopian standards • Current driver's licence

Overhead costs	May include but not limited to : • Rental and leasing costs • Utilities • Non-production resources • Depreciation of plant and equipment • Warehousing costs • Insurance and other costs incurred by doing business • Supply costs, including catalogues, contracts, standing agreements, market rates and warehousing margins

Evidence guide	
Critical aspects of competence	Must demonstrate skills and knowledge in: • Observe safety procedures and requirements • Communicate effectively with others involved in or affected by the work • Select appropriate methods and techniques • Interpret proposals, specifications and instructions for the work • Obtain information relevant to the determination of costs • Calculate and cost accurately the quantities of parts and materials, the amount of labour and time required to complete the work, and overheads for a range of machinery repair, maintenance and modification quotes • Document the process and outcomes in accordance with enterprise practice
Required knowledge and attitudes	Must demonstrate knowledge of: • Methods and processes for identifying, apportioning, summarising and validating total costs for work • Components of labour costs • Current assessing and quoting methodologies • Commercial approaches to warehousing and physical distribution and costing • Manufacturer and component supplier specifications and manuals, including costing catalogues • Applicable legislation, regulations, standards and codes of practice, including occupational health and safety (OHS), personal safety and environment, relevant to calculating Machinery repair and maintenance costs • Organizational policies and procedures, including quality requirements, reporting and recording procedures, related to calculating machinery repair and maintenance costs
Required skills	Must demonstrate skills to: • Technical skills to the level required to use internet and other workplace technology related to calculating work costs • Communication skills to the level required to verify costs with others, to report work outcomes and problems, and to relate to people from a range of social, cultural and ethnic backgrounds and of varying physical and mental abilities • Literacy skills to the level required to undertake costing research, and

	to document and report findings • Numeracy skills to the level required to estimate and calculate labour, materials and on-costs and to validate work costs • Problem-solving skills to the level required to anticipate costing problems and to avoid reworking, wastage, and planning and scheduling problems • Team skills to the level required to work effectively and cooperatively with others to optimise workflow and productivity
Resources implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and ohs practices.
Methods of assessment	Competency may be assessed through: • Interview / written test • Observation / demonstration with oral questioning
Context of assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational standard : Agricultural Machinery and Equipment Maintenance Level IV	
Unit Title	**Develop value chain analysis**
Unit Code	**AGR MEM4 08 0322**
Unit Descriptor	This unit covers the knowledge, skills, and attitude needed to Understand value chain ,Identify concepts of value chain ideas Develop the value chain and Upgraded value addition

Elements	Performance Criteria
1. Understand concepts of value chain	1.1 ***Concept of value chain*** is understood. 1.2 Value chain scopes are understood and identified. 1.3 ***Principle of value chain*** are understood and identified. 1.4 Value chain ***characteristic are*** understood and identified. 1.5 Value chain ***Importance*** are discussed and understood. 1.6 ***Concept of value addition are*** understood and determined.
2.Identify Value chain analysis	2.1 ***Dimension*** and ***structures*** of Value chain are identified and interpreted 2.2 ***Value chain actors*** are identified according to the objective and interest or need of chain actors 2.3 ***Value chain maps*** are illustrated for different ***agricultural products*** 2.4 Value chain techniques for **value addition** are identified and analyzed 2.5 ***Contract farming*** system is established to promote value chain.
3.Dvelop value chain	3.1 Value chain ***parameter***s are analyzed to compare the gaps between the existing and the benchmark. 3.2 ***Constraints and gaps*** are collected, analyzed and ranked according to the priority used to develop value chain 3.3 ***Steps of value chain*** development are identified 3.4 Value Chain ***selection techniques*** are identified to develop value chain 3.5 Potential ***interventions*** for value chain development are identified
4. Upgrade value addition	4.1 ***Environmental considerations*** are understood to upgrade value addition development 4.2 Value chain actors are identified for ***Value addition*** 4.3 Value chain is ***upgraded*** for agricultural products to measure performance of value chain development 4.4 Custemer feedbacks are collected, organized and documented to improve Custemer satisfaction

Variable	Range
Concept value chain	May include, but not limited to • Market oriented products • General Principle • Value chain actor • Mapping • Value addition
Principles of value chain	May include, but not limited to • Value chain mapping • Identifying the distribution of benefits of actors • Examining the role of upgrading • Governance in the value chain
Characteristic	May include, but not limited to • Inbound logistic • Operation • Out bound logistic • Marketing • Sales • Services
Importance	May include, but not limited to • Simple and better way to identify gaps and technologies. • Increases efficiency and systemic competitiveness of local enterprise • Primary targets involvement between local sector and sub sector • Reduces production costs and improves profitability • Improves customer satisfaction by providing quality product and service
Dimension	May include, but not limited to • Sourcing of Inputs and supplies • Production capacity and technology • End-markets and trade • Governance of value chains
Structures	May include, but not limited to • Input sector: • Farm/production sector: • Product sector
Value chain actors	May include, but not limited to • Farmers, • Traders, • Processors, • Transporters • Wholesalers

	• Retailers and final consumers

Agricultural sectors	May include, but not limited to • Crop farming • Forestry • Livestock • Fisher and aquaculture • Agricultural cooperative • Agricultural extension service
Parameters	May include, but not limited to • Yield • Quality • Cost • Time
Technology constraints	May include, but not limited to • Marketability • Profitability • Capability and Usefulness • Functionality • Import Substitution • Feasibility • Adaptability • Potential Impact to the MSE • Woman Empowerment • Employment
Steps of value chain	May include, but not limited to • Value chain selection • Data collection • Value chain mapping • Value analysis • Gap identification • Prioritizing constraints • Technology identification & categorization
Selection technique	May include, but not limited to • Integration economic • Environmental • Social • Institutional
Environmental considerations .	May include , but not limited to: • Sustainability of the land use system for production and processing • Sources of energy • Efficiency of energy use • Greenhouse gas emissions • Water use efficiency and possibilities of contamination

	• Quantity and character of chemicals being used • Waste production and management
Value addition	May include, but are not limited to: • measured against its contribution to the customer • Technical benefits/features • Location benefits/features • Aesthetic benefits/features • Information benefits/features
Contract farming	May include, but are not limited to: • Agreement between buyer and seller • Farmer and processing making firm for production • Supple of agricultural product
Upgraded	May include, but are not limited to: • Farm crop • Milk and Milk Products • Meat and Meat Products • Poultry Products • Fish and Fish Products • Honey and Honey Products

Evidence Guide	
Critical Aspects of Competence	A Candidate must demonstrate the ability to: • Understand concept of value chain • Identify Value chain actors • Apply techniques for value addition • Understand selection technique to develop value chain • Identify potential interventions to value chain analysis • Evaluate value chain addition • Contract farming system is established to promote value chain • Describe value chain upgraded and identify environmental issues for value chain development
Required Knowledge and Attitude	A candidate must demonstrate the knowledge and attitude to : • Understand concepts of value chain • Understand and Recognize characteristic of value chain • Understand dimension and structures of value chain • Identify principles of value chain for agricultural production • Identify value chain actors and Illustrate value chain mapping in agricultural product • Identify value chain analysis improve vale chain development • Understand the Bench mark analyze to develop value chain analysis • Observe environmental issue to upgrade Value chain

	• Determine value chain upgrade and focus on Value chain addition
Required Skills	A candidate must demonstrate the Skills to : • Identify concepts of value chain • Recognize and describe characteristic of value chain • Describe dimension and structures of value chain • Apply principles of value chain for agricultural production • Classify value chain actors and Illustrate value chain mapping in agricultural sector • Analyze the Bench mark to develop value chain analysis • Apply value addition and determine value chain upgrade development value chain analysis • Contract farming system is established to promote value chain • Describe value chain upgraded and identify environmental issues for value chain development
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview/Written Test • Observation/Demonstration with Oral Questioning

List of participants

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