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MINISTRY OF LABOR AND SKILLS

Agricultural Machinery and Equipment Mechanics

Level – III

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MINISTRY OF LABOR AND SKILLS



TVET Curriculum Version-I

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Preface

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

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

This curriculum has been developed by a group of professional experts from different Regional TVET Bureaus, colleges, Industries, Institutes and universities based on the occupational standard for **Agricultural Machinery and Equipment Mechanics Level III.** The curriculum development process has been actively supported and facilitated by **Ministry of Labor and Skills.**

1 TVET-Program Design

1.1 TVET-Program Title: Agricultural Machinery and Equipment Mechanics Level III

1.2 TVET-Program Description

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

The prime objective of this training program is to equip the Trainees with the identified competences specified in the OS. **Graduates are therefore expected to** Service Electronic fuel Injection systems and components, Repair Air Conditioning System, Service and Repair Chemical Spraying Machinery and Equipment, Repair Harvesting Machineries, Maintain Post-Harvest Machinery and Equipment ,Service and Repair Irrigation Pump, Perform Engine Tune Up, Repair and test Pneumatic Systems/Components, Repair and test Hydraulic Systems, Overhaul Diesel Injection Pump and Apply Digital Technology in Agriculture in accordance with the performance criteria and evidence guide described in the OS.

1.3 Training Program Structure

Unit of Competence	Module Code & Title	Learning Outcomes	Duration (In Hours)
AGR MEM3 01 0322 Service Electronic fuel Injection systems and components	AGR MEM3 M01 0922: Servicing Electronic fuel Injection systems and components	• Prepare for work • Repair/service electronic diesel injection components • Service electronic gasoline fuel injection components	

AGR MEM3 10 0322	Repair Air Conditioning	AGR MEM3 M02 0922	Repairing Air Conditioning	• Prepare to diagnose and repair air conditioning • Diagnose air conditioning • Repair air conditioning • Complete work processes	
AGR MEM3 08 0322	Service and Repair Chemical Spraying Machinery and Equipment	AGR MEM3 M03 0922	Servicing and Repairing Chemical Spraying Machinery and Equipment	• Prepare chemical sprayer for service and repair • Conduct spray machinery and Equipment maintenance • Complete service and repair of Spraying machinery and equipment	
AGR MEM3 05 0322	Repair Harvesting Machineries	AGR MEM3 M04 0922	Repairing Harvesting Machineries	• Prepare to repair harvesting machine • Carry out repair harvesting machine • Complete harvesting machine maintenance	
AGR MEM3 06 0322	Maintain Post-Harvest Machinery and Equipment	AGR MEM3 M05 0922	Maintaining Post-Harvest Machinery and Equipment	• Prepare to inspect and service post-harvest equipment • Conduct inspection and analyse results • Service and repair post-harvesting	

		equipment • Complete post-harvest equipment maintenance	

AGR MEM3 07 0322	Service and Repair Irrigation Pumps	AGR MEM3 M06 0922	Servicing and Repairing Irrigation Pumps	• Prepare to carry out service and repairs • Carry out service and repairs • Complete repair and service activities	
AGR MEM3 01 0322	Perform Engine Tune up	AGR MEM3 M07 0922	Performing Engine Tune up	• Prepare for tune up work • Bleeding injection system components • Check/adjust valve clearance • Test /adjust dwell angle and ignition setting, engine idle speed and mixture • Conduct compression testing • Conduct cylinder head leak test • Carryout power balance test • Conduct exhaust gas and oscilloscope test	
AGR MEM3 05 0322	Repair and test Hydraulic Systems	**AGR MEM3 08 0322**	Repairing and Testing Hydraulic Systems	• Prepare to repair and install hydraulic systems • Carry out repair and installation	

				• Complete repair and installation	
AGR MEM3 04 0322	Repair and test Pneumatic Systems/Components	AGR MEM3 M09 0322	Repairing and Testing Pneumatic Systems/Components	• Prepare to repair pneumatic systems/ Components • Service, repair and install pneumatic systems/ components • Conduct and analyse pneumatic system tests	
AGR MEM3 10 0322	Overhaul Diesel Injection Pump	AGR MEM3 M10 0322	Overhauling Diesel Injection Pump	• Prepare to undertake the overhaul of diesel fuel injection pump • Test diesel fuel injection pump • Overhaul diesel fuel injection pump • Complete diesel injection pump Overhaul	
AGR MEM3 11 0322	Apply Digital Technology in Agricultur	AGR MEM3 M11 0322	Applying Digital Technology in Agriculture	•	

1.4 Duration of the TVET-Program

The Program will have duration of **900** hours including the on school/ Institution training and on-the-job practice or cooperative training time. Such cooperative training based on realities of the industry, nature of the occupation, location of the TVET institution, and other factors will be considered in the training delivery to ensure that trainees acquire practical and workplace experience.

S. No	Module title	TVET Institution training		Cooperative training	Total hours	Remark
		Theory	Practical			
1.	Service Electronic fuel Injection systems and components	25	45	15	85	
2.	Repairing Air Conditioning	15	35	10	60	
3.	Servicing and Repairing Chemical Spraying Machinery and Equipment	25	40	15	80	
4.	Repairing Harvesting Machineries	36	74	10	120	
5.	Maintaining Post-Harvest Machinery and Equipment	30	55	15	100	
6.	Servicing and Repairing Irrigation Pumps	15	60	5	80	
7.	Performing Engine Tune up	30	55	10	95	
8.	Repairing and Testing Hydraulic Systems	25	50	15	90	
9.	Repairing and testing Pneumatic Systems/Components	20	45	5	70	
10.	Overhauling Diesel Injection Pump	25	50	5	80	
11.	Applying Digital Technology in Agriculture	10	20	10	40	
Total hour		256	529	115	**900**	

1.5 Qualification Level and Certification

Qualification is a formal certificate issued by an official agency in recognition to that an individual has been assessed as achieving learning outcomes or competencies to the standard specified for the qualification title. A qualification confers official recognition of value in the labour market and in further education and training. Based on the descriptors elaborated on the Ethiopian National TVET Qualification Framework (NTQF) the qualification of this specific TVET Program is **Certificate III** according to the level. The trainee will be awarded transcript and the institutional certificate after successfully completing all the modules in the level.

1.6 Target Groups

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

1.7 Entry Requirements

In principle everyone should be able to access training based on the labor market. Hence the prospective participants of this program are any citizens who possess the entry requirement directive of the Ministry of Labor and Skills.

1.8 Mode of Delivery

This TVET-Program is characterized as a formal Program on middle level technical skills. The mode of training delivery is in the institution and co-operative training. Cooperative training is a model of training by the cooperation of enterprises/industries and TVET institutions whereby trainees spend much of their time in the enterprises/industries to acquire industrial knowledge, skills, experiences, and attitudes of the industrial environment and the remaining time in TVET institutions to acquire basic skills and theoretical concepts. Therefore, it is necessary to make the TVET sector more effective by strengthening a system of cooperative training accepted by the industry.

The program will employ different alternatives of cooperative training such as apprenticeships, internship and traineeship based on the nature of the occupation, location of the TVET institutions, and interest of the industry. In addition, in the areas where industry is not sufficiently available the established production and service centers/learning factories in TVET institutions will be used as

cooperative training places. The Training-Institution and identified companies should have to take an agreement to co-operate with regard to the implementation of this program.

1.9 Institutional Assessment

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

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

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

Techniques or tools for obtaining information about trainees' achievement include oral or written test, demonstration and on-site observation. Therefore, a trainee is required to earn at least 60% to be theoretically qualified. This result should be 18% or more when converted to 30%. Regarding performance appraisal results, it must score at least 80% or at least 32% or more when converted to 40%. Must cooperate at least 80% out of 100% in cooperative training; When converted to 30%, it must register 24%.

1.10 TVET Teachers Profile

The trainers conducting this particular TVET Program are **----Level** and above who have satisfactory practical experiences or equivalent qualifications.

1.11 Inclusive training and aassessment methodology

The program is delivered using a variety of training methods. The table below shows training and assessment methodology for non-impaired trainees and with reasonable adjustment for impaired trainees. In addition, as per the nature of the module title the trainer can use recommended and possible training and assessment methodology.

Learning Methods:				
For none impaired trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in Audio/video ❖ Organize the class room seating arrangement to be accessible to trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in Audio/video ❖ Organize the class room seating arrangement to be accessible to	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for	❖ Organize the class room seating arrangement to be accessible to trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users.

	trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop
Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ provide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ provide tutorial support (if necessary)	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist ❖ Conduct close follow up ❖ provide tutorial support (if necessary
Group discussion	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Brief the thematic issues of the work	❖ Use sign language interpreters ❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Inform the group	❖ Introduce the trainees with their peers

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

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

		❖ Time extension	❖ Time extension	

2. Learning Module Design

Module Code and Title	AGR MEM3 M01 1022: Servicing Electronic fuel Injection systems and components
Nominal Duration :	85Hrs

Module Description : This module covers the knowledge, attitude and skill required to preparation for work, servicing of diesel and gasoline EFI system components and completion of work processes.

Learning Outcomes

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

LO-1 Prepare for work

LO-2 Repair/service electronic diesel injection components

LO-3 Service electronic gasoline fuel injection components

Module Contents:

LO-1: Prepare for work

1.1 Service work requirements

1.2 OHS and warnings

1.3 Applicable national environmental protection measure/ guidelines

1.4 Procedures and information

1.5 Equipment and tool

1.6 System component

1.7 Operating principles of diesel and gasoline electronic fuel injection system

1.8 Technical and/or calibration requirements for the testing and overall of the system

1.9 Diagnostic/Test techniques, procedures and analysis

LO-2 Repair/service electronic diesel injection components

2.1 Determining extent of work
2.2 Implementing system test
2.3 Carrying out repair/service of diesel electronic fuel injection system components
2.4 Comparing and documenting results and reporting
2.5 Repair/Service work schedule documentation

LO-3 Service electronic gasoline fuel injection components

3.1 Applying test applications and inspections

3.2 Adjustment and replacement of Injection components 3.3 Checking, inspecting and repairing common rail fuel supply systems 3.4 Service and repair related components 3.5 Documenting results and reporting 3.6 Repair/Service work schedule documentation

Learning Methods:
• Lecture • Group discussion • Demonstration • Video show • Simulation • Exercise • Individual assignment
Assessment Methods:
• Written test/Interview • Oral questioning • Practical demonstration/Observation

Assessment Criteria:
LO-1: Prepare for work • Service work requirements identified and confirmed. • Procedures and information such as workshop manuals, specifications and tooling and

equipment acquired.

- Methods in identifying diesel and gasoline electronic fuel injection components applied.
- Appropriate service equipment is selected and prepared.
- Technical and/or calibration requirements for the testing and overall of the system are sourced and support equipment identified and prepared.
- OHS and warnings in relation to working with diesel and gasoline vehicle observed throughout the work operation.
- Applicable national environmental protection measure/ guidelines is sourced and observed throughout the work operation

LO-2: Repair/service electronic diesel injection components

- Extent of work is determined and confirmed.
- Appropriate system test implemented in accordance with workplace procedures and manufacturer specifications.
- Repair/Service of diesel electronic components and gasoline fuel injection system and its components is carried out
- Results documented with evidence, supporting information and recommendations.
- Report forwarded to appropriate persons for action in accordance with workplace procedures.
- Results compared with manufacturer specifications to verify and indicate compliance or non-compliance.
- Repair/Service work schedule documentation is completed.

LO-3: Carry out steering system servicing and repair

- Appropriate test applications and inspections are applied
- Injection are adjusted and replaced
- Common rail fuel supply systems are checked, inspected and repaired
- Service and repair related components according to service specifications
- Results documented with evidence, supporting information and recommendations.
- Repair/Service work schedule documentation is completed
- Report forwarded to appropriate persons for action in accordance with workplace procedures.

Module Code and Title	**AGR MEM3 M02 1022 Repairing Air Conditioning System**
Nominal Duration :	**60Hrs**

Module Description : This module covers the 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 finalization processes, including clean-up and documentation

Learning Outcomes

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

LO-1 Prepare to diagnose and repair air conditioning

LO-2 Diagnose air conditioning

LO-3 Repair air conditioning

LO-4 Complete work processes

Module Contents:

LO-1 Prepare to diagnose and repair air conditioning

1.1 Job requirements

1.2 OHS requirements and Personal Protective Equipment

1.3 Identification of components

1.4 Sourcing and interpreting Diagnostic information

1.5 Selecting and analyzing diagnostic options

1.6 Workplace information sources**,** technical and/or calibration requirements

1.7 Tools, equipment and materials

1.8 Selecting and checking serviceability of diagnostic tools and equipment

LO-2 Diagnose air conditioning

2.1 Carrying out diagnostic tests

2.2 Safe operating procedures

2.3 Identifying faults from diagnostic test

2.4 Diagnosis findings and recommendations

LO-3 Repair air conditioning

3.1 Repairing method and sequences

3.2 Selecting and analyzing repair options

3.3 Carrying out component repair, replacement and adjustment

3.4 Recharging the system with refrigerant gas

3.5 Post-repair testing to confirm quality requirement

LO-4 Complete work processes

4.1 Final inspection

4.2 Cleaning work area; and dispose waste and non-recyclable materials

4.3 Checking and storing tools and equipment

4.4 Identifying, tagging, and isolating faulty electrical equipment

Learning Methods:

- Lecture
- Image and video
- Group discussion
- Demonstration
- Audio

Assessment Methods:

- Written test
- Oral questioning
- Quiz
- Presentation
- Practical demonstration

Assessment Criteria:

LO-1: Prepare to diagnose and repair air conditioning

- Job requirements are determined from workplace instructions
- OHS requirements and Personal Protective Equipment needs are applied throughout the work.
- Diagnostic information is sourced and interpreted
- Workplace information sources and technical and/or calibration requirements are accessed for repairing air conditioning components.
- Hazards associated with the work are identified and risks are managed according to

environmental requirement.

- Repair tools, equipment and materials are selected and checked according to manufacturer specifications and workplace procedures
- Diagnostic tools and equipment are selected and checked for serviceability

LO-2: Diagnose air conditioning

- Diagnostic tests are carried out according to workplace procedures
- Safe operating procedures are applied
- Faults are identified from diagnostic test results and causes of faults are determined
- Diagnosis findings and recommendations for necessary repairs or adjustments are reported according to workplace procedures

LO-3: Repair air conditioning

- Repair method is applied according to work procedure
- Repair options are analyzed and those most appropriate to the work are selected
- Repairs and component replacements and adjustments are carried out according to requirements, and without causing damage to components or systems
- System is recharged with the appropriate refrigerant gas according to manufacturer specifications and workplace procedures
- Post-repair testing is carried out according to workplace procedures to confirm quality requirement

LO-4: Complete work processes

- Final inspection is made to ensure work is to workplace expectations and the vehicle or machinery is presented ready for use
- Final inspection is made to ensure protective guards, safety features and cowlings are in place
- Work area is cleaned, waste and non-recyclable materials are disposed of, and recyclable material is collected.
- Tools and equipment are checked and stored and faulty electrical equipment is identified, tagged and isolated according to workplace procedures
- Workplace documentation are completed and processed according to workplace procedures

Module Code and Title	**AGR MEM M03 1022: Servicing and Repairing Chemical Spraying Machinery and Equipment**
Nominal Duration :	80Hrs
Module Description : This module 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	
Learning Outcomes At the end of the module the trainee will be able to: LO-1 Prepare chemical sprayer for service and repair LO-2 Conduct spray machinery and Equipment maintenance LO-3 Complete service and repair of Spraying machinery and equipment	
Module Contents:	

LO-1: Prepare chemical sprayer for service and repair

1.1 Preparing basic service application

1.2 Potential Occupational Health and Safety (OHS) hazards , risks and controls procedures

1.3 Types of spraying equipment, components, and working principles

1.4 Tools and equipment for calibration

1.5 Requirement for chemical usage

LO-2 Conduct spray machinery and Equipment maintenance

2.1 Pre-operational inspection and checks of chemical application equipment

2.2 Servicing and maintaining spraying machinery and equipment

2.3 Replacing damaged or worn components

2.4 Calibrating spraying equipment

2.5 Potential environmental impacts

2.6 Checking spray components.

2.7 Monitoring and adjustments machinery performance and efficiency.

2.8 Machinery service and repair

LO-3 Complete service and repair of Spraying machinery and equipment

3.1 Cleaning and decontaminating application equipment

3.2 Cleaning Nozzles, valves controllers and spraying components

3.3 Malfunctions, faults, emergency procedures and irregular performance or damage

3.4 Reporting and documentations

Learning Methods:

- Lecture
- Group discussion
- Demonstration
- Video show
- Simulation
- Exercise
- Individual assignment

Assessment Methods:

- Written test/Interview
- Oral questioning

- Practical demonstration/Observation

Assessment Criteria:

LO-1: Prepare chemical sprayer for service and repair

- Prepare a basic service application according to workshop procedures
- Types of spraying equipment, components, and working principles are identified
- Potential Occupational Health and Safety (OHS) hazards are identified and followed.
- Spray equipment is identified for chemical and fertilizer application according to company procedure
- Identify health and safety hazards, risks and controls procedures for selected chemical application operation
- Tools and equipment required for calibrations are prepared
- The requirement for chemical usage is identified according to chemical label instructions

LO-2: Conduct spray machinery and Equipment maintenance

- Pre-operational inspection and checks of chemical application equipment carried out and confirmed

- Servicing and maintaining spraying machinery and equipment are implemented
- Damaged or worn components are replaced.
- Spraying equipment is calibrated in accordance with manufacturers' procedure to meet the desired application rate
- Potential environmental impacts are identified and reported.
- Spray components are checked for correct operation.
- Machinery performance and efficiency are monitored and adjustments made as required.
- Machinery service and repair are implemented in accordance with task requirements, conditions and manufacturers operating guidelines.

LO-3: Complete service and repair of Spraying machinery and equipment

- Clean and decontaminate application equipment according to operator manual instructions, MSDS (Material safety data sheet) and legislative and regulatory requirements
- Nozzles, valves controllers and spraying components are cleaned to prevent clog and damage
- Malfunctions, faults, emergency procedures and irregular performance or damage are identified, tested and reported.
- Reporting and documentations are implemented

Module Code and Title	**AGR MEM3 M04 1022:Repairing Harvesting Machineries**
Nominal Duration :	**120Hrs**
Module Description : This module covers the knowledge, skills and attitudes required to Complete harvesting machine maintenance, carry out repair harvesting machine and prepare to repair harvesting machine.	
Learning Outcomes At the end of the module the trainee will be able to: LO-1 Prepare to repair harvesting machine LO-2 Carry out repair harvesting machine LO-3 Complete harvesting machine maintenance	
Module Contents: **LO-1: Prepare to repair harvesting machine**	

1.1 Workplace information sources

1.2 OHS requirements and Personal Protective Equipment

1.3 Types and layouts of service/repair manuals

1.4 Tools, equipment and materials

1.5 Types of harvest machineries/equipment's

1.6 Component of harvest machineries

1.7 Working mechanism of harvesting machineries

1.8 Inspection of harvest machineries

1.9 Technical and/or calibration requirements

1.10 Emergency procedures

1.11 Environmental requirements

1.12 Warnings in relation to working with harvesting machines

LO-2: Carry out repair harvesting machine

2.1 Harvesting machineries repairing/service procedures

2.2 Repairing harvesting machineries

2.3 Comparing repair results to manufacturer specification

2.4 Documenting the result

LO-3: Complete harvesting machine maintenance

3.1 Final adjustment

3.2 Clean and store the equipment

3.3 Completing repair documentation

3.4 Process job card

3.5 Recording, documenting data and Reporting

Learning Methods:

- Lecture
- Group discussion
- Demonstration/practical
- Role playing
- Brainstorming

Assessment Methods:

- Written test
- Oral questioning/assignment
- Practical demonstration

Assessment Criteria:

LO-1: Prepare to repair harvesting machine

- Workplace information sources are identified.
- OHS requirements and Personal Protective Equipment needs are applied throughout work.
- Tools, equipment and materials are identified and prepared.
- Method options are analyzed and those most appropriate to the work are selected.
- Technical and/or calibration requirements are applied.
- Warnings are applied in relation to working with harvesting machines

LO-2: Carry out repair harvesting machine

- Procedures for repairing harvesting machineries are followed and applied.
- Harvesting machineries are repaired according to manufacturer's repair manual instruction
- Repair results are compared with manufacturer specifications to indicate compliance or non-compliance.
- Results are documented with evidence and supporting information and recommendation(s) made.

LO-3: Complete harvesting machine maintenance

- Equipment and systems are run and final adjustments with oil, grease are made to achieve and

maintain operating parameters.

- Equipment is cleaned for use or storage to workplace expectations.
- Repairs documentation is completed.
- Job card is processed in accordance with workplace procedures.
- Necessary data is recorded, documented and reported for the concerned body

Module Code and Title	**AGR MEM3 M05 1022: Maintaining Post-Harvest Machinery and Equipment**
Nominal Duration :	100Hrs

Module Description : This module covers the knowledge, attitude and skill required to Complete post-harvest equipment maintenance, service and repair post-harvesting equipment, conduct inspection and analyze results and prepare to inspect and service post-harvest equipment.

Learning Outcomes

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

LO-1 Prepare to inspect and service post-harvest equipment

LO-2 Conduct inspection and analyse results

LO-3 Service and repair post-harvesting equipment

LO-4 Complete post-harvest equipment maintenance

Module Contents:

LO-1: Prepare to inspect and service post-harvest equipment

1.1 Nature and scope of repair requirements

1.2 Workplace information sources

1.3 OHS requirements and Personal Protective Equipment

1.4 Types, characteristics and components of post-harvest technologies

1.5 Operating principles of mechanical and hydraulic systems and their relationship to each

other

1.6 Procedures and information

1.7 Tooling, equipment and materials

1.8 Repair method options

1.9 Inspection , technical and/or calibration requirements

1.10 Calculate material requirements and establish quality checks

1.11 Warnings with post harvesting equipment.

LO-2 Conduct inspection and analyse results

2.1 Inspection methods and procedures

2.2 Compare inspection results

2.3 Report results and documents

LO-3 Service and repair post-harvesting equipment

3.1 Maintenance procedures

3.2 Tools and materials requirement

3.3 Equipment adjustments

3.4 Implement techniques and methods

3.5 Final inspection

LO-4 Complete post-harvest equipment maintenance

4.1 Service/repairs schedule documentation

4.2 Clean equipment

4.3 Process job card

Learning Methods:

- Lecture
- Group discussion
- Demonstration
- Video show
- Simulation
- Exercise
- Individual assignment

Assessment Methods:

• Written test/Interview • Oral questioning • Practical demonstration/Observation

Assessment Criteria:
LO-1: Prepare to inspect and service post-harvest equipment • Nature and scope of post-harvest equipment repair requirements identified and prepared. • Workplace information sources are applied • OHS requirements and Personal Protective Equipment needs applied throughout work. • Characteristics and components of post-harvest technologies are identified • Procedures and information such as maintenance manuals, tooling, equipment and materials are prepared. • Repair method options are analysed and those most appropriate to the work selected and prepared. • Technical and/or calibration requirements sourced for inspecting post-harvesting equipment and support equipment identified and prepared. • Warnings observed in relation to working with post harvesting equipment. **LO-2: Conduct inspection and analyse results** • Inspection methods implemented. • Inspection results compared with manufacturer specifications. • Results and documents reported with evidence, supporting information and recommendation(s). **LO-3: Service and repair post-harvesting equipment** • Maintenance procedures are applied according to manual instruction

- Tools and materials requirement is prepared, and applied for service and repair.
- Adjustments are made according to the specification
- Techniques implemented for service and repair in accordance with workplace procedures.
- Final inspection made to ensure maintenance is to workplace expectations.

LO-4: Complete post-harvest equipment maintenance

- Service/repairs schedule documentation is completed.
- Equipment cleaned for use or storage to workplace expectations.
- Job card is processed in accordance with workplace procedures

Module Code and Title	**AGR MEM2 M06 1022: Servicing and Repairing irrigation pumps**
Nominal Duration :	**80Hrs**

Module Description : This module covers 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.

Learning Outcomes

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

LO-1 Prepare to carry out service and repairs

LO-2 Carry out service and repairs

LO-3 Complete repair and service activities

Module Contents:

LO-1 Prepare to carry out service and repairs

1.1 Workplace information sources

1.2 Occupational Health and Safety requirement and Personal Protection Equipment (PPE)

1.3 Application, Purpose, Operating principles and power sources of irrigation pumps

1.4 Material ,Equipment and tools

1.5 Procedure and method

1.6 Safe operating procedures

1.7 Resources require for inspection of irrigation pump.

LO-2 Carry out service and repairs

2.1 Inspecting irrigation pumps

2.2 Service , repairs and overhauling of irrigation pumps

2.3 Checking pumping efficiency, discharge rate and performance

2.4 Reporting Complex faults and repairs

LO-3 Complete repair and service activities

3.1 Completing service and repair activities

3.2 Reassembling and testing pump

3.3 Cleaning and storing work site, tools and equipment

3.4 Environmental requirements for disposal

3.5 Collecting, treating and disposing waste from service and repair activities

Learning Methods:

- Lecture
- Assignment
- Image and video
- Group discussion
- Demonstration
- Role playing
- Brainstorming

Assessment Methods:

- Written test
- Oral questioning
- Practical demonstration

Assessment Criteria:

LO-1 Prepare to carry out service and repairs

- Workplace information sources are accessed, interpreted and procedures strictly adhered.
- OHS requirements and Personal Protective Equipment needs are applied throughout the work
- Tools, equipment and materials appropriate to job requirements are selected and inspected for serviceability.
- Appropriate procedure and method for repair and service are selected and prepared in accordance with standard safe operating procedures.
- Resources required for inspection of irrigation pump with power sources are identified and prepared.

LO-2 Carry out service and repairs

- Service and repairs of irrigation pumps are carried out according to manufacturer specifications, operator manuals and enterprise requirements.
- Irrigation pumps inspected for servicing or repair
- Repair and overhauling irrigation pumps
- Pumping efficiency, discharge rate and performance is checked
- Complex faults and repairs are reported
- Procedures are applied to minimise task time.

LO-3 Complete repair and service activities

- Complete service and repair activities
- The pumps or components with its power sources is reassembled and testedaccording to standard test procedure
- Work site, tools and equipment are cleaned, returned to operating order and stored according to

OHS and enterprise requirements.

- Waste from service and repair activities is collected, treated and disposed or recycled according to enterprise environmental requirements.
- Relevant information is documented.

Module Code and Title	**AGR MEM4 M07 1022 Performing Engine Tune up**
Nominal Duration :	**95 Hrs**

Module Description : This module 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

Learning Outcomes

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

LO-1 Prepare for tune up work

LO-2 Bleeding injection system components

LO-3 Check/adjust valve clearance

LO-4 Test /adjust dwell angle and ignition setting, engine idle speed and mixture

LO-5 Conduct compression testing

LO-6 Conduct cylinder head leak test

LO-7 Carryout power balance test

LO-8 Conduct exhaust gas and oscilloscope test

Module Contents:

LO-1: Prepare for tune up work

1.1 Workstation ready for tune up activities

1.2 Tools, equipment and materials

1.3 Engine operating principles

1.4 Injection system components

1.5 Engine tune up

1.6 Engine parts failure

1.7 Inspectioning and re-checking injection required in setting injection timing

1.8 Instructional manuals

1.9 Checking and inspecting belts and battery

1.10 Checking timing advance operation

LO-2: Bleeding injection system components works

2.1 Checking fuel level, line leakage and fuel strainer/filter

2.2 Determining air lock free fuel system

2.3 Identifying bleed screw and primer pumps

2.4 Re-checking timing marks, torque and injection pump moving parts motion

2.5 Servicing and testing injection nozzle

2.6 Setting -up injection pump requirement in installing injection pump

LO-3: Check/adjust valve clearance

3.1 Setting and adjusting valve clearance

3.2 Analyze test result

3.3 Performing valve clearance adjustment according to firing order

LO-4: Test /adjust dwell angle and ignition setting, engine idle speed and mixture

4.1 Adjusting dwell angle

4.2 Setting and adjusting ignition timing

4.3 Checking engine speed

4.4 Testing and checking the system and its components

LO-5: Conduct compression testing

5.1 Setting up engine requirements in compression testing

5.2 Conducting compression test

5.3 Reading and interpreting specific compression test result

5.4 Giving corresponding recommendation/prescription based on the test result.

LO-6: Conduct cylinder head leak test

6.1 Setting up engine requirements in air leakage testing

6.2 Cylinder head leakage test

6.3 Reading and interpreting test result

LO-7: Carryout power balance test

7.1 Setting up engine requirements in power balance testing

7.2 Conducting test

7.3 Comparing and interpreting specific test result

LO-8: Conduct exhaust gas and oscilloscope test

8.1 Setting up engine requirements in exhaust gas testing

8.2 Conducting test

8.3 Reading and interpreting specific test result

Learning method

- Lecture
- Assignment
- Image and video
- Group discussion
- Demonstration
- Role playing
- Brainstorming

Assessment Methods:

- Written test
- Oral questioning
- Practical demonstration

Assessment criteria

LO-1: Prepare for tune up work

- Workstation is made ready for tune up activities
- Necessary tools, equipment and materials are identified and made ready for use
- Injection system components are checked and made ready for tune up
- injection required in setting injection timing is positioned and inspected as per manufacturer's manual
- Injection timing setting is re-checked following instructional manuals
- belts and battery are checked and inspected
- Timing advance operation checked

LO-2: Bleeding injection system components

- Fuel level, line leakage and fuel strainer/filter are checked
- Air lock free fuel system is determined without error
- Bleed screw and primer pumps are identified without error.
- Timing marks, torque and injection pump moving parts motion is re-checked before installation
- Injection nozzle is serviced and tested
- Injection pump requirement in installing injection pump per manual instruction is set-up
- Mounting bolts are tightened following torque sequence, pattern and specification in the manual

LO-3: Check/adjust valve clearance

- Valve clearance is set and adjusted following manufacturer's specifications
- Test result analyzed and appropriate recommendations are prescribed.
- Valve clearance adjustment performed according to firing order

LO-4:Test /adjust dwell angle and ignition setting, engine idle speed and mixture

- Dwell angle is adjusted

- Ignition timing is set and adjusted
- Engine speed (rpm) is checked
- Testing and checking are performed without damage to the system and its components

LO-5: Conduct compression testing

- Engine requirements in compression testing is set up
- Compression test is conducted without damage or injury to person or property
- Specific compression test result is read and interpreted
- Corresponding recommendation/prescription is given based on the test result.

LO-6: Conduct cylinder head leak test

- Engine requirements in air leakage testing is set up
- Cylinder head leakage test is conducted without damage or injury to person or property
- Test result is read and interpreted

LO-7: Carryout power balance test

- Engine requirements in power balance testing is set up
- Test is conducted without damage or injury to person or property
- Specific test result is compared and interpreted

LO-8: Conduct exhaust gas and oscilloscope test

- Engine requirements in exhaust gas testing is set up
- Test is conducted without damage or injury to person or property
- Specific test result is read and interpreted

Module Code and Title	AGRMEM4 M08 1022: Repairing and Installing Hydraulic Systems
Nominal Duration :	**90Hrs**

Module Description : This module covers the knowledge, skills and attitudes required to Complete repair and installation, carry out repair and installation and Prepare to repair and install hydraulic systems.

Learning Outcomes

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

LO-1 Prepare to repair and install hydraulic systems

LO-2 Carry out repair and installation

LO-3 Complete repair and installation

Module Contents:

LO-1: Prepare to repair and install hydraulic systems

1.1 Workplace information sources and procedures

1.2 OHS requirement and personal protective equipment

1.3 Procedures and information sources

1.4 Types and layout of service/repair manuals (hard copy and electronic)

1.5 Hydraulic systems and its component

1.6 Operating principles of hydraulic systems and components with the relationship to each other

1.7 Operation of actuators, conductors, pressure flow, and directional valves control systems(RK)

1.8 Hydraulic system operating procedures

1.9 Hydraulic System schematic diagrams

1.10 Tools, equipment and materials

1.11 Testing technical requirement

1.12 Warnings in relation to working with hydraulic system

LO-2: Carry out repair and installation

2.1 Safe operating procedures for use of tools/equipment's

2.2 Emergency procedures

2.3 Methods and techniques

2.4 Remove hydraulic components

2.5 Cleaning, inspection and replacing hydraulic parts and components

2.6 Installation procedures

2.7 Adjustment and installation

2.8 Documenting and report

2.9 Environmental requirement

LO-3: Complete repair and installation

3.1 Final inspection

3.2 Clean and store farm machineries and equipment

3.3 Documenting

3.4 Process job card

Learning Methods:
• Lecture • Group discussion • Demonstration • Video showing • Brainstorming
Assessment Methods:
• Written test • Oral questioning • Group work • Practical demonstration

Assessment Criteria:

LO-1: Prepare to repair and install hydraulic systems

- **Workplace information sources are accessed and procedures strictly adhered.**
- OHS requirements, including requirements and Personal Protective Equipment needs are observed throughout the work.
- Procedures and information such as workshop manuals and specifications, tools and equipment including materials are identified and prepared.
- Technical requirements are used for testing; repairing and installing hydraulic systems are implemented.
- Warnings are observed in relation to working with hydraulic systems.

LO-2: Carry out repair and installation

- Safe operating procedures are observed and noted during the use of tools/ equipment in accordance with workplace guidelines.
- Emergency procedures are identified and followed as per organization's guideline.
- Methods and techniques for repair and installation are implemented in accordance with workplace procedures and manufacturer specifications.
- Careful removal of hydraulic components and hydraulic oil leakage prevention is applied.
- Hydraulic parts and components cleaning, inspection, replacing seals/O-rings and required maintenance are performed.
- Adjustments set up, correction and installation is implemented in accordance with manufacturer specifications.
- Data collection, registration, documentation and Reporting are processed in accordance with workplace procedures.
- Environmental requirements are observed and precautions implemented according to workplace and environmental protection regulation or guidelines**.**

LO-3: Complete repair and installation

- Final inspection is made to ensure leakage protection, components proper functionality and usage.

- Final inspection is made to ensure safe work application in accordance with workplace expectations.
- Farm machineries and equipment system are cleaned for use or storage to workplace expectations.
- Repair and installation documentation is completed
- Job card is processed in accordance with workplace procedures

Module Code and Title	AGR MEM4 M09 1022: Repair and Install Pneumatic Systems/Components
Nominal Duration :	70Hrs

Module Description : This module covers knowledge, attitude and skill required to conduct and analyses pneumatic system tests, service, repair and install pneumatic systems/ components and prepare to repair pneumatic systems/ Components

Learning Outcomes

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

LO-1 Prepare to repair pneumatic systems/ Components

LO-2 Service, repair and install pneumatic systems/ components

LO-3 Conduct and analyse pneumatic system tests

Module Contents:

LO-1: Prepare to repair pneumatic systems/ Components

1.1 Pneumatic systems components

1.2 Types, characteristics, uses and limitations of common pneumatic systems

1.3 Operating principles of pneumatic systems and their relationship to each other

1.4 Types and layout of service/repair manuals

1.5 Techniques for interpretation of schematic diagrams relevant to pneumatic systems

1.6 Identifying and confirming work requirement

1.7 OHS requirements and personal protection needs

1.8 safety procedures and requirements

1.9 Pneumatic systems testing procedures and information

1.10 Method selection and preparation

1.11 Technical testing requirements

1.12 Selecting and preparing tools and equipment

1.13 Warning observation

LO-2: Service, repair and install pneumatic systems/ components

2.1 Removing, assembling, and repairing according to workplace procedures

2.2 Adjustment under manufacturer specifications

2.3 Documentation of observation

LO-3 Conduct and analyse pneumatic system tests

3.1 Methods for testing

3.2 Comparing test results with manufacturer/component supplier specifications.

3.3 Final checks and adjustments

3.4 Making a final inspection

3.5 Cleaning pneumatic systems for use and storage

3.6 Result documentation and Preparing a report

Learning Methods:
• Lecture • Image and video • Group discussion • Demonstration • Audio
Assessment Methods:
• Written test • Oral questioning • Quiz • Practical demonstration

Assessment Criteria

LO-1: Prepare to repair pneumatic systems/ Components

- Work requirements are identified and confirmed
- OHS requirements and personal protection needs are applied throughout the work
- Procedures and information such as workshop manuals and specifications are arranged
- Method options are selected and prepared
- Technical and testing requirements for pneumatic systems are prepared and support equipment is identified
- Support tooling and equipment are selected and prepared for use
- Warnings are observed in relation to working with pneumatic systems

LO-2: Service, repair and install pneumatic systems/ components

- Removing, assembly and repairing are implemented in accordance with workplace procedures
- Adjustments are made during the assembly, repair and installation in accordance with manufacturer specifications
- Documentation of observations is completed

LO-3 Conduct and analyse pneumatic system tests

- Methods for tests are implemented in accordance with workplace procedures and manufacturer specifications
- Test results are compared with manufacturer/component supplier specifications
- Air braking test results are compared with manufacturer specifications to indicate compliance or non-compliance
- Final checks and adjustments are made
- Results are documented with evidence and supporting information and recommendation(s) made
- Final inspection is made to ensure work is to workplace expectations
- Pneumatic systems are cleaned for use or storage to workplace expectations
- Report is forwarded to persons for action in accordance with workplace procedures

Module Code and Title	AGRMEM4 M10 01022: Overhauling Diesel Injection Pump
Nominal Duration :	80Hrs

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude 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.

Learning Outcomes

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

LO-1. Prepare to undertake the overhaul of diesel fuel injection pump

LO-2. Test diesel fuel injection pump

LO-3. Overhaul diesel fuel injection pump

LO-4. Complete diesel injection pump Overhaul

Module Contents:

LO1: Prepare to undertake the overhaul of diesel fuel injection pump

1.1 OHS requirements and personal protection equipment

1.2 National environmental protection measure

1.3 Procedures and information

1.4 Application, purpose and operation

1.5 Selecting, preparing and analyzing method options

1.6 Technical and/or calibration requirements

1.7 Types and layout of service/repair manuals

1.8 Warnings in relation to working with diesel fuels

LO2: Test diesel fuel injection pump

2.1 Testing methods

2.2 Comparing test results

2.3 Documenting and reporting results

LO3: Overhaul diesel fuel injection pump

3.1 Accessing and interpreting information

3.2 Overhaul methods and sequences

3.3 Diagnostic procedures

3.4 Calibration and phasing procedures 3.5 Carrying out overhaul of diesel fuel injection pump 3.6 Performing/adjusting injection timing 3.7 Completing diesel fuel injection pump overhaul **LO4: Complete diesel injection pump Overhaul** 4.1 Completing work schedule documentation 4.2 Final inspection 4.3 Cleaning and storing 4.4 Processing job card

Learning Methods:
• Lecture and discussion • Practical démonstration • Practical exercice • Audio Visual
Assessment Methods:
• Written test • Oral questioning • Practical • Assignment • Presentation

Assessment Criteria:
LO1: **Prepare to undertake the overhaul of diesel fuel injection pump** • OHS requirements, including regulatory requirements and personal protection needs are

observed throughout the work

- National Environmental Protection Measure for Diesel Vehicles (Guidelines) is sourced and observed throughout the work as applicable to tasks
- Procedures and information such as workshop manuals, specifications and tooling, are sourced
- Method options are analyzed and those most appropriate to the circumstances are selected and prepared
- Technical and/or calibration requirements for the testing and overhaul of diesel fuel injection pump is sourced and support Equipment is identified and prepared
- Warnings in relation to working with diesel fuels are observed

LO2: Test diesel fuel injection pump

- Methods for conducting diesel fuel pump tests are implemented in accordance with workplace procedures and manufacturer specifications
- Test results are compared with manufacturer specifications to indicate compliance or non-compliance
- Results are documented with evidence and supporting information and recommendations made
- Report is forwarded to appropriate persons for action in accordance with workplace procedures

LO3: Overhaul diesel fuel injection pump

- Information is accessed and interpreted from manufacturer/ specifications
- Overhaul of diesel fuel injection pump is carried out in accordance with manufacturer specifications
- Injection timing is performed/adjusted
- Diesel fuel injection pump overhaul is completed without causing damage to any component or system

L LO4: Complete diesel injection pump Overhaul

- Work schedule documentation is completed
- Final inspection is made to ensure protective guards, safety features and cowlings are in place
- Final inspection is made to ensure work is to workplace expectations
- Diesel injection pump components are cleaned and/or stored to workplace expectations
- Job card is processed in accordance with workplace procedures

Module Code and Title : **AGR MEM3 M11 0322** **Applying Digital Technology in Agriculture**
NOMINAL DURATION : 40hours
MODULE DESCRIPTION : This module 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.

LEARNING OUTCOMES

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

LO1. Understand the Concept of digital technology

LO2. Apply Digital technologies among rural population and farmers

LO3. Recording and documentation

MODULE CONTENTS:

LO1. Understand the Concept of digital technology

1.1. Introduction to Digital technologies

1.2. Role of digital technologies in agriculture

1.3. Principles of Agricultural technology

1.4. Understanding mobile/Smart phones and template functions

LO2. Apply Digital technologies among rural population and farmers

2.1 Identifying and coordinating required tools and equipment

2.2 Identifying infrastructures

2.3 Develop digital technology skills

2.4 Develop digital Agri-preneurial skill

2.5 Using digital technology communication tools

2.6 Using digital technologies, tools and techniques

2.7 Promoted implementation of digital technologies

LO3. Recording and documentation

3.1. Developing data collecting formats

3.2. Data collection methodologies

3.3. Organize, analyze and interprete collected data

3.4. Documenting and reporting data

3.5. Collecting feedbacks from the relevant stakeholders

LEARNING METHODS:

- Lecture and Discussion
- Démonstration
- Simulation

• Individual Exercise • Group Discussion
ASSESSMENT METHODS:
• Written Test • Practical demonstration with Oral questioning • Individual Assignment

ASSESSMENT CRITERIA:

LO1. Understand the Concept of digital technology

- Digital technologies are understood to apply digital technology.
- Importance of digital technologies are understood in agricultural sector
- Role of digital technologies in agriculture is identified to enhance agricultural development.
- Principles of Agricultural technology are identified to apply in the agricultural sector
- Mobile/Smart phones and template functions are understood to collect data and use in the reporting system

LO2. Apply Digital technologies among rural population and farmers

- Require tools and equipment are identified and coordinated to apply digital technologies
- Digital technology infrastructures are identified to implement in agricultural development
- Digital technology skills are developed among the rural population
- Digital Agri-preneurial skill is developed for agricultural transformation.
- Digital technology communication tools are used to collect data and reporting system
- Digital technologies, tools and techniques are used to deliver digital education
- Implementation of digital technologies is promoted to enhance productivity

LO3. Recording and documentation

- Data collecting formats are developed based on the needs
- Data collection methodologies are identified and selected based on the intended objectives
- Collected data are organized, analyzed and interpreted based on the intended objectives
- Organized, analyzed and interpreted data are documented and reported
- Feedbacks are collected from the relevant stakeholders

3. Resource requirements

Item No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio
A.	Learning Materials			
1.	TTLM	TTTLM prepared by the trainer	25	1:1
2.	Reference Books			
2.1	A Practical approach to motor vehicle engineering and maintenance	(author: Allan Bonnick, Derek Newbold; Third Edition; 2011; ISBN: 978-0-08-096998-5)	5pcs	1:5
2.2	Automobile Mechanical and Electrical Systems	Tom Denton, Elsevier Ltd (2011)	5 pcs	1:5
2.3	Automotive air conditioning	Training manual; Aria zone automotive and industrial refrigerant service equipment	5pcs	1:5
2.4	Automotive Air-conditioning and climate control systems	Author: Steven Daly; 2006; ISBN-13: 978-0-7506-6955-9 ISBN-10: 0-7506-6955-1	5pcs	1:5
2.5	Automotive Suspension & Steering System	Don Knowles, Cengage Delmar Learning, (2007)	5pcs	1:5
2.6	Automotive Technology Principles, Diagnosis, and Service	James D. Halderman,Fourth Edition ,(2012)	5pcs	1:5
2.7	Automotive Technology Systems Approaches	Jack Erajavec, 5th edition , (2009)	5pcs	1:5
2.8	Automotive technology: vehicle maintenance and repair	Author: Tom Denton; Fourth Edition; 2017; ISBN: 978-0-415-72576-7 ISBN: 978-1-315-85661-2	5pcs	1:5
2.9	Basic wheel alignment fundamentals	Specialty Products Company • Toll Free Hotline 800-525-6505	5pcs	1:5
2.10	CIGR Handbook of Agricultural Engineering	Bill A. Stout and Bernard Cheze, Plant Production Engineering Volume Volume III, LCCN 98-93767 ISBN 1-892769-02-6,(1999)	5pcs	1:5

2.11	Combine Harvester Instruction Book	Sampo Rosenlew Ltd, 2011	5 pcs	1:5
2.12	Farm Machinery And Equipment	HARRIS P., A.E., MCGR,w-HILL BOOK COMPANY, INC. (1937)	5 pcs	1:5
2.13	Farm Power and Machinery	ICAR e-course ,www.Agrimoon.com	5pcs	1:5
2.14	Field operation and maintenance of tractors and farm machinery II	Dr.Baldev & Dr. D.N.Sharma,	5 pcs	1:5
2.15	Handbook of Pumps and Pumping	Brian Nesbitt	5 pcs	1:5
2.16	HVAC system for cars and automotive vehicles	Author Anuj Bhatia; Continuing Education and Development, Inc. 22 Stonewall Court Woodcliff Lake, NJ 07677	5pcs	1:5
2.17	Instruction manual RBM-400-T Beet Harvester	Agrifac B.V , 8330 AB Steenwijk, 2002	5	1:5
2.18	Maintain Small-Farm Equipment	Steve and Ann Larken Hansen, Storey Publishing.	5 pcs	1:5
2.19	Owner's Manual WATER PUMP	WH15X/WH20X ,honda	5	1:5
2.20	Popular Mechanics complete Car manual	Leonello Calvetti, Ron Carbone , Paul Dimare, Steve Karp, Don Mannes , Russell J. Von Sauers And Jeff Trish, Division of Sterling Publishing Co., Inc.(2003)	5 pcs	1:5
2.21	Testing and evaluation of agricult1ral machinery and equipment: Principles and practices	D.W. Smith B.G. Sims D.H. O'Neill, FAO (1994)	5 pcs	1:5
2.22	The Car care book four	Ron Haenfer, Brake system	5pcs	1:5

	edition	(2010) Page 207-2010		
2.23	Trade of motor mechanic	(Produce by SOLAS: module 7; Curriculum Revision 2.2 16-01-07; 2013	5pcs	1:5
2.24	Training Manual on Solar PV Pumping System	Alternative Energy Promotion Centre (AEPC) Training Manual on Solar PV Pumping System Prepared by: GRID Nepal in joint venture with Center for Energy Studies Institute of Engineering, TU September 2014	5 pcs	1:5
2.25	Troubleshooting Rotating Machinery	Robert X. Perez and Andrew P. Conkey	5 pcs	1:5
2.26	Wheel alignment method feasibility study	(author: Daniel Korhonen; 2020)	5pcs	1:5
2.27	Detroit Diesel Engines SERIES 53	Service manual	5	1:5
2.28	SECTION 2 ENGINE TUNE -UP -	Steve's 1971 Honda 600 Coupe	5	1:5
2.29	Automotive Technology Systems Approac	Automotive Technology Systems Approach 5 t h e d i t i o n Jack Eerjavec	5	1:5
2.30	Engine Tune-Up Guide	1957 Corvette engine	5	1:5
2.31	Tune-up procedures	http://www.yunost.ru ›02-Engine performance	5	1:5
2.32	Automotive Engine Performance: Tune-up, Testing, and Service Volume II-Practice Manual (2nd Edition)	by Ken Layne	5	1:5
2.33	Hydraulics and pneumatics, a technicians and engineers guide	Author: Andrew par; third edition; 2011; ISBN-13: 978-0-08-096674-8	5	1:5
2.34	Pneumatics basic level	Author: Peter Croser, Frank Ebel; 2002; Festo Didactic.TP101, Order	5	1:5

		No.093131		
2.35	Pneumatic and hydraulic control system	Seminar on Pneumohydraulic automation , volume 1	5	1:5
2.36	Pneumatic actuating system for automatic equipment	Author: Igor L.Krivts, and German V.Krejinin; 2006; ISBN 0-8493-2964-7	5	1:5
2.37	Mechanical engineering	Author: Alan Darbyshire; third edition; 2010; ISBN 978-0-08-096577-2	5	1:5
2.38	Fluid power engineering	Author: M. Galal Rabie; 2009; ISBN: 978-0-162606-4	5	1:5
2.39	Fluid power	Author: albert Beasley; 1990; training manual	5	1:5
2.40	Air break manual	Brunswick manual; www.gnb.ca/publicsafety; ISBN 1-55396-034-3	5	1:5
2.41	Modern diesel technology: Heavy equipment systems	Robert Huzij, Angelo Spano, Sean Bennett, 2ND EDITION, 2014	6	1:5
2.42	Practical hydraulic system: Operation and Troubleshooting for Engineers and Technicians	Ravi Doddannavar, Andries Barnard, 2005.	5	1:5
2.43	Roller /RD 11/: Repair Manual	Wacker, 2007	5	1:5
2.44	Fuels and lubricants handbook : technology, properties, performance, and testing	George E Totten & Steven R Westbrook & Rajesh J Shah,2003	5	1:5
2.45	Advanced Automotive Fault Diagnosis. Automotive Technology. Vehicle Maintenance and Repair	Tom Denton, 2017	5	1:5
2.46	Design and Validation of High-Bandwidth Fuel	Jonathan A;2003	5	1:5

	Injection Systems for Control of Combustion			
2.47	Designing and Tuning High-Performance Fuel Injection Systems	Greg Banish,2009	5	1:5
B.	Learning Facilities & Infrastructure			
1.	A0 Paper	80gms	1 ream	1:25
2.	A3 Papers	80gms	1 ream	1:25
3.	A4 papers	80gms	5 reams	1:5
4.	Adhesive tagging sticker	min.97*67,7mm, white, printable	5 packs	1:5
5.	Automotive fuse	2A-35A; in assortment box	Set	
6.	Brake fluid:	Automotive use; DOT 3, DOT 4	Liter	
7.	CD/DVD	700MB – 1GB	5 pcs	1:5
8.	Chalk	White color	1packet	1:25
9.	Class room	31.5 m^2	1	1:25
10.	Cleaning Rug	Cotton, rubber	5kg	1:5
C.	Consumable Materials			
1.	Different color papers	A4, vertical Size:23232218mm Nw: 311g Color Random	1 pcs	1:25
2.	Duplication room	20m^2	1	1:25
3.	Electrical Tape	Material:pvc Application:low voltage rated voltage:600v tensile strength:30n/10mm Feature:High Temperature Resistance Thickness:0.10-0.20mm Width:10mm-1260mm Length:3m-50m	5	1:5
4.	Eraser	Size: 35*21*10mm	5 pcs	1:5
5.	Firs Aid Kit	Size: 36*27*4.5 cm or customized, Material: 600D, Packing: polybag	5 pcs	1:5

6.	Fittings	Material: Plastic, PVC Application: Agricultural Farmland Irrigation System Usage: Water-saving Irrigation System Size:20-400mm Working pressure:9 bar Connection method: Thread Connecting MOQ:50pcs	5	1:5
7.	Flip chart		5 pads	1:25
8.	Fluorescent dye leak detector	UV Leak Detector Type: A/C System; Volume: 8 oz;	5 lit	1:5
9.	Gaskets	Size: Standard size Material: metal rubber repair kit 3	5	1:5
10.	Grease	Thickener: Li soap, Base oil: Mineral oil, dropping point ©: 160,Penetration (1/10 mm at 25^{0}C): 280, Viscosity of Base oil at (40^{0}C)	1can	1:25
11.	Insulation tapes	Width: 18mm or customized Thickness: 130um or customized Length:	5 pcs	1:5
12.	Internet room	100 m^2	1	1:25
13.	Leak detector fluid	Volume: 8 oz. Type: Multi-dose, services up to 64 vehicles. 8 oz (237 ml). Pre-Filled & Disposal	5 lit	1:5
14.	Lubricants oil	SAE 10W-30/40		
15.	Masking tapes	Adhesive Side: Single Sided Adhesive Type: Hot Melt Material: crepe paper Feature: Waterproof Use: MASKING Thickness:0.13-0.14MM Width: as requirement Length: Customization	5 pcs	1:5

		Color: any color		
16.	Oil	SAE grade: SAE 15W 40, API service class:, TBN: 9.7 mg KOH/g ASTM D, Viscosity at 100^0C: 14 cSt ASTM D 445, Viscosity index: 130 ASTM D 2270, Flash point: >200^0C ASTM D 92, Pour point: -27^0C, Specific gravity at 15^0C:0.871 g/cm^3, Ca content (ppm):min. 2580 max. 3036, Zn content (ppm): min1363 ma. 336, p content(ppm): min. 298 max. 1474		1:25
17.	Pencil Sharper	size: 3.7*3.5*1.8cm, weight: 8.5g Material: Plastic, Drive Type: Manual and Waterproof	5 pcs	1:5
18.	Pencils	Made from Wood + graphite and Environmental friendly, writing smoothly and not easy to break	5pcs	1:25
19.	Penetrating fluid	(WD40)	2 pack	1:13
20.	Photocopier ink/toner	Compatible with the existing printer	1pcs	1:25
21.	Pipes	Material: PVC Specification:3/4"-16" Length:10m/30m/50m/100m Thickness:1mm-4mm Working pressure:2-10bar Working temperature:-5°C to +65°C	1 roll	1:25
22.	Refrigerant oil	Built to last; Made from high-quality materials for ultimate durability	5 lit	1:5

23.	Seals	Type:MG1 MG13 M3N M7N H7N 560A 560D Stationary Face Material: CA/TC/Sic/Cer Rotary Face Material: CA/TC/Sic/Cer Secondary Seal Material:FKM/NBR/EPDM Metal Component:SS304/SS316 Temperature:40~120 (NBR)/-20~250 (FKM)	5 pcs	1:5
24.	Simulation laboratory room	100 m^2	1	1:25
25.	valves	Size:2.5 inch ,3 inch,4 inch,5 inch 6, inch8, inch Material: Forged Pressure: Other	5 pcs	1:5
26.	Water	Natural water	25 Litter	1:1
27.	Wires	type: Bare Application: signal transmission Conductor Material: Copper Clad Aluminum Conductor Type: Solid Insulation Material: none Color: copper	5 pcs	1:5
28.	Workshop	100 m^2	1	1:25
D.	**Personal Protective Equipment**			
1.	First aid set	min 65 pcs, incl, wall holder, DIN13157	5 pcs	1:5
2.	Half-face respiratory mask	against toxic gas and fumes: FFA 1p2 RD, EN405:2001+A1:2009	25 pcs	1:1
3.	Plastic boot	Material: Rubber Feature: Waterproof	25 pcs	1:1

		Outsole Material: PVC Waterproof: Waterproof		
4.	Powder fire extinguisher	ABC, EN 3 standard, includes wall brackets	5 pcs	1:1
5.	Protection glove	size 9, CE certified	25 pcs	1:5
6.	protection gloves:	size 9, CE certified	25 pcs	1:1
7.	Protection goggles	scratch resistant, against mechanical hazards (mechanical strength)	25 pcs	1:25
8.	Respiratory mask,	no valve, DIN EN149, FFP1	25 pcs	1:1
9.	Rubber gloves	battery acid resistant, EN 374, Cat III	25 pcs	1:25
10.	Safety shoes	mixed sizes, safety category S1 (EN ISO 20345:2011)	25 pcs	1:1
11.	Transparent Eye goggle	Type: Protective goggles Material: PVC Frame adjustment: none Lens thickness: 0.05 Lens color: transparent Light transmittance: 98 Function: Anti-fog, sand, dust and fog Specifications: bag (single pack) protective glasses, box (single pack)	25pcs	1:1
12.	Working overall	size M-XL	25 pcs	1:5
E.	**Tools and Equipment**			
1.	Adjustable pipe wrench:	1/2”-2”; CV-steel, ISO 8976	5 pcs	1:5
2.	Air compressor	min/max pressure	1Pc	1:25

		output :40/60bar; tank volume min70liter; quick action coupling: min 2; nominal voltage 230V/AC protection class: IP 44 and EN 60529		
3.	Air dryer	Power (Watts): 1000 W; Power (HP): 1.3 hp; Airflow (CFM): 120; Electric Current: 8.3 A; Cord Length: 12'; Weight: 3 lb; Voltage: 120 V	1 pc	1:25
4.	Allen key	10pcs set;MM:0,7,0,9,1,27,1,5,2,0,2, 5,4,0,4,5,5,0,5,5,6,0,7,0,8,0,10, 0;inch:0.028,0.036,0.036,0.05, 1/16,5/64,3/32,7/64,1/8,9/64,5/ 32,3/16,7/32,1/4,5/16,3/8;DIN 911	1set	1:25
5.	Anti-slip slide screw wrench/adjustable spanner	Model Number:TYAS-1 Material:45# steel Max opening:350mm Character: normal Surface treatment: Polished Chrome Length:300mm	5set	1:5
6.	Bench vice:	small: clamping jaw width 120mm, max clamping width 120mm, clamping depth 65mm; big: clamping width 140mm, max. clamping width 180mm, clamping depth; DIN 69893	5 pc	1:5
7.	Boom sprayer	Material: Metal and Plastic Type: Tractor Drawn Boom Sprayer Boom: 21m Specification:3900mm x 3100 mm x 2500 mm	5 pcs	1:5
8.	Bottle car jack:	5ton ,10ton: conforms with	5 pcs	1:5

		VBG-8 standard		
9.	Calculator	Usage: Promotional Calculators, Pocket Calculator :Max. Digits:8 ,Power Source: Electronic Certification: RoHS Type: Electronic Calculator	5 pcs	1:5
10.	C-clamps:	length 280mm, jaw adjustment 10-70mm, heavy-duty CV-steel;	5pc	1:5
11.	Chain block	lifting capacity :3000kg; lifting Hight :3m; tempered and galvanized chain according to EN818-7		
12.	Chisel set :	4 pieces set: CV -hardened steel; hardened safety impact head; completely hardened shaft; regrind able blade; electrician chisel, body work chisel, stone chisel, joint chisel	1set	1:25
13.	Chopper	Dimension(L*W*H):213*71* 115CM,Weight: 190 kg, Max. Capacity:6.5 ton/h	5 pcs	1:5
14.	Clamps.	Dimensions: Each 4 inch c clamp measures 8 x 4 x 0.6 inches in length; the maximum clamp width is 1.97 inches	5pcs	1:5
15.	Cold storage	Voltage: 380v 440v/3p/50hz, 220v 460v/3p/60hz, Power: Customized, Dimension(L*W*H):Customized, Temperature:+10~-10℃, -15~-25℃, -30~-	5 pcs	1:5

		40℃,Refrigerant: R-22 R-404A R-134A,Cooling capacity: From 1800W to 95600W,Refrigerant:R-22 R-404A R-134A,Cooling capacity: From 1800W to 95600W,Doors:Sliding door/ Hinged door, Store: Meat, Food, Sea Food, Fish, fruits, vegetable		
16.	Combination wrench:	28 pieces; metric; DIN 3113A/ISO 3318/7738;5.5mm,6mm,7mm, 8mm,9mm,10mm,11mm,12m m,13mm,14mm,15mm,16mm, 17mm,18mm,19mm,20mm,21 mm,22mm,23mm,24mm,25m m,26mm,27mm,28mm,29mm, 30mm,32mm,34mm,	1set	
17.	Condensers	Parallel Flow; Core Material: Aluminum; Height (in): 4.9 in	5 pcs	1:5
18.	Crimper	Steel; pressing and crimping five different sizes of connectors: 3/8", 5/16", 5/8", 3/4", and 1/2"	5 pcs	1:5
19.	Crusher	Type: Feed Pellet Machine, Voltage: 220V/380V or as customized, Raw materials: Bran, maize, soybean, cereal, Weight: 800 kg, Core Components: Motor, Max. Capacity:200KG/H, Capacity:200-300kg/h	5 pcs	1:5
20.	Decorticator	Production Capacity:300Kg/h,	5 pcs	1:5

		Voltage: 220V/380V,Dimension(L*W*H):1280*65*1360mm,Weight: 135 KG, Broken rate:≤3%,Damage rate:≤2%,Husking rate:≥9		
21.	Dehuller	Production Capacity:10000KGS, Processing Material: wheat, grass seeds, Dimension(L*W*H):1650*1000*1700mm,Total Power:10.85 k	5 pcs	1:5
22.	Desktop Computer	64-bit OS; 8 GB RAM; Intel core i7 (Processor)	25 pcs	1:1
23.	Diagonal Cutters	Length :6in Max Opening Capacity :1 1/8in	5 pcs	1:5
24.	Double open-end wrench	12 pieces; metric; double -end; CV-steel; DIN 3110/ISO 1085;6*7mm,8*9mm,10*11mm,12*13mm,14*15mm,16*17mm,18*19mm,20*22mm,21*23mm,24*27mm,25*28mm,30*32mm	1set	1:25
25.	Double ring wrench:	12 pieces; metric; double end; CV -steel; DIN 838 /ISO 3318 ;8*9mm,10*11mm,12*13mm,14*15mm,16*17mm;18*19mm,20*22mm,21*22mm,21*23mm,24*27mm,25*28mm,30*32mm	1set	1:25

26.	Driers	Power:18.5kw,Dimension(L* W*H):1.2x15m,Weight (KG):16000,Evaporation Capacity(kg/h): 2000,Voltage:380V,Dryig process: Continuous Automatic Drying	5 pcs	1:5
27.	Electrical tools box	Type: Hand Number of Pieces:102PCS		
28.	Electro-mechanical tool box	Tool Includes: Combination Application: Repairing Tools Dimensions: Standard	5 pcs	1:5
29.	Electronic leak detector	Automatic calibration; Mechanical pump design; 3 sensitivity levels;	5 pcs	1:5
30.	Emergency Wheel Lock Remover	Drive Size: 1/2" Square; Weight: 1 lb (0.5 kg)	5 pcs	1:5
31.	Engine analyzer	3 3/4 digits, maximum reading 3999It Dwell: 3-4-5-6-8 CYL Tacho: 3-4-5-6-8 CYL Temperature: 0 to 750°C Cap: 40nF to 200µF Frequency: 0.1 to 40MHz Duty cycle: 0.1 to 99.9% DCV: 0.1mV to 1,000V ACV: 0.1mV to 750V DCC/ACC: 400µA to 10A HFE: 10µA Diode check: 3V/1mA Size: 200 x 97 x 48mm Weight: 495g (with holster)	5 pcs	1:5
32.	Engine stand:	heavy duty, min950 kg; 4position points (angle and width adjustable); 360^0 pivoted mounting plate; 6swivel castors;	5 pcs	1:5
33.	Engine stand:	heavy duty, min950 kg; 4position points (angle and width adjustable); 360^0 pivoted	5Pc	1:5

		mounting plate; 6swivel castors;		
34.	Evaporators temperature sensor	Connector Quantity: 1; Height: 0.8 in; Length: 6.2 in; Terminal Quantity: 2; Terminal Type: Blade; Weight (lb): 0.01 lb; Width: 1.2 in	5 pcs	1:5
35.	Exhaust gas analyzer	Detection gas: 1.CFCs: R12/R11/R500/R503. 2. HCFCs: R22/R123/R124/R502. 3. HFCS: R134a/R404a/R125. 4. Detection of ethylene oxide gas 5. High pressure development: SF-6. 6. Detection of halogen gases (fluorine, chlorine, bromine elements) 7. Halon gas in the fire extinguishing system.	5 pcs	1:5
36.	Extractor	Voltage:380v,Power:7.5kw,Weight:75KG,Dimension(L*W*H):780*320*860mm,Application:Fruit,Capacity:300~500kg/h	5 pcs	1:5
37.	Fertilizer spreader	total Weight: 850kg-2500kg Tractor HP Required:50HP-100HP Loading Weight:1000kg-12000kg Loading Capacity 0.8-7m^3 Specification:1500mm*1750m	1 pcs	1:25

		m*3100mm		
38.	Graduated Jar	Capacity:1000ml,Glass Type: Clear Glass, cup accesserior with handle	5pcs	1;25
39.	Grease gun with lever	volume 500gr grease (500cm^3), NLGI- Klass 2	5 pcs	1:5
40.	Hammer set:	machinists hammer, Germen type,300gr, length 300mm, DIN 1041, curved ash handle; sledged hammer, German type, steel head ,3000gr.600mm, DIN 1042, ash handle	5Set	1:5
41.	Heavy duty bottle -jack H- frame hydraulic press;	multi position bed; working range: max height:.> or = 800mm, max width:> or =550mm; bed opening :> or =120mm; ram dia.:45mm; safety: type-C-norm, DIN EN 693	1 pc	1:25
42.	Heavy duty lever;	in length 60cm; drop forged carbon steel; fine tapered and ground ends	5 pcs	1:15
43.	High Current Test Set	Output current: AC: 1000A 5V or 500A 10V primary current range:0~1100A Secondary current range:0 ~ 6A	1 pc	1:25
44.	High pressure cleaner	pressure 140-180bar; output max 400 L/integrated high-pressure hose with steel pressure pipe 1050mm.	5 pcs	1:5
45.	Hydraulic Pressure gauge	Range min:275 bar/4000 psi; Test couplings for push-pull quick connectors (ISO 7241), G1/8, G1/4, G3/8, M10*1.5, UNF7/16-20, UNF9/16-18, NPT1/4, M8*1	5set	1:5

46.	Hydrometer /battery acid tester	tube length min.52 mm, volume min 18cm^3	1pc	1:25
47.	Hydrostatic tester	Power: Electronic Hydrostatic Head Tester: Water Pressure Hydrostatic Head Tester Water Pressure Tester: Hydrostatic Head Tester Standards: AATCC 127 ;DIN 53886 ;	1 pcs	1:25
48.	Impact Wrench	Power Supply Type: :AC Power Supply Voltage: 230V, torque:500nm	5pcs	1:5
49.	Lap top	64-bit OS; 8 GB RAM; Intel core i7 (Processor)	1 pc	1:25
50.	Lifting crane:	lifting capacity up to 2 ton; lifting height min 2m; EN 1494:2000+A:2008	5 pcs	1:5
51.	Lifting hook:	lifting capacity 2ton ,3 ton; complies with GS-OA 15-04-EN 1677	5 pcs	1:5
52.	Line Disconnect	10-Piece; OE style, Spring Lock style, Scissors style, and Clip-on style; range of 3/8" diameter to 7/8"diameter line sizes	1pc	1:25
53.	Low-Resistance Ohmmeter	Measuring Range: 0~80 mΩ Testing Voltage: DC 10 V Accuracy Class:0.5% Operating Temperature:-10℃ ~ 50 ℃, -10℃~50℃ Dimensions:360mm*235mm *270m Output Current:100 A Output Current Gears:50 A, 100 A Open Circuit Voltage: DC 10 V Resolution:0.0001 μΩ	5 pcs	1:5
54.	Lubricants	L-HM Anti-wear Hydraulic Oil (High Pressure) GB11118.1; ISO 11158 (L-	5 gal	1:5

		HM)		
55.	Lug wrench	Socket size: 17 mm (11/16"), 19 mm (3/4"), 21 mm (13/16"), 22 mm (7/8"); finish: Chrome-Plated	5 pcs	1:5
56.	Lung nut sockets	1/2" Drive Metric 6-Point Standard Impact Socket Set (25 Pieces)	5 pcs	1:5
57.	Maize Sheller	Production Capacity:2500-4500 kg/h, Power: above or 15hp,power:tractor pto, type: thresher, usage: maize threshing, Dimension(L*W*H): 1350*800*1100 mm	5 pcs	1:5
58.	Manual tachometer	With rpm min/max. 0.5/20.000; m/min(min/max);0.5/1999.9; with set of contact wheels; conforms to CE; Infra-red/non-contact tachometer with rpm range 2 to 100 rpm: measuring distance 500mm; laser category II	2Pc	1:12.5
59.	Mechanical Silo	Weight:44670 KG, Application: Cereal / bulk grain storage,Capacity:100-5000 T, Coating: Galvanized 275g/m, Volume: 6693m^3,Dimension(L*W*H):	5 pcs	1:5
60.	Megaohmmeter	Measuring Range:0.5MΩ~10TΩ Testing Voltage:250v-12000v Accuracy Class: ±10%rdg±3dgt Operating Temperature:0℃ - 40 ℃ Dimensions:320mm*275mm *145mm	1pcs	1:25

		Product name: Insulation resistance tester megger Weight:4kg		
61.	Multimeter	Measuring VoltageRange:999.9mV/9.999V/99.99V/999.9V Measuring Resistance Range: 999.9/9.999K/99.99K/ 999.9K/9.999M/99.99M Measuring Capacitance Range: 99.99nF/999.9nF/9.999uF/ 99.99uF/9.999mF/99.99mF	5 pcs	1:5
62.	Nozzle tester	Dimensions:20*13*7cm, Power Supply:110v/220v, Frequency:600-6000rpm, Ultrasonic Cleaning Power:50W, Application: Standard Injectors, High Volt Injectors	5 pcs	1:5
63.	OBD (On Board Tool Diagnostic)Tool	Memory card capacity: 1GB 1530mAh rechargeable battery Compact main unit standard equipment for technicians Only wireless communication Supports Bluetooth and 100m cable communication Universal 16 pins connector Improved program running speed Convenient to software update 4.3-inch high luminance and resolution color touch screen Standard USB printer connector and external printer support	5 pcs	1:5
64.	Ohmmeter	Measuring Current Range:	5 pcs	1:5

		200-1000A; Measuring Resistance Range: 200-2K-20K-200K-2MΩ		
65.	Open end wrench	Characteristics: Normal Material: rebar System: Metric Opposite side size: 8-24mm Surface treatment: Galvanized Weight: 0.056 (g)	5set	1:5
66.	Par boiler	Steam Production:300KG/H, Fuel: Electric, Rated evaporation:100kg/h-500kg/h, steam temperature:170℃-184℃,Weight: 280kg-1080kg, 280kg-1080kg,Rated voltage:3N AC 50HZ 380V,Rated working pressure: 0.7Mpa(7bar)-0.8Mpa(8bar)	5 pcs	1:5
67.	Peeling machine	Power: 6.35kw,Weight:500 KG, Dimension(L*W*H): 6000*1500*1700mm,Voltage: 380V	5 pcs	1:5
68.	Plier set:	long-nose combination pliers, strong wire cutter, long reach needle nose pliers w transverse profile (long, medium size); carpenters' pincers (cutting edge length 33mm); VDE tested, complies with GPSG	5 set	1:5
69.	Pressure test kit	25- piece; includes blue and black radiator cap test connectors; Detects and exposes external system leaks	5 pcs	1:5
70.	Pressure tester	test pressure:0 - 300 PSI / 0 - 21 kg / cm^2, Weight:4.112kg, Size:46*10*34cm Test Unit/Mode: Bar, PSI Pressure gauge	5 pcs	1:5

		diameter:75mm thread size:M10 x 1.0mm, M12 x 1.25mm, M14 x 1.25mm, M18 x 1.5mm		
71.	Propeller meter	Accuracy: Better than 1% Repeatability: Better than 0.2% Power Supply:90-230VAC (built-in Ni-MH rechargeable battery lasts for over 14 hours Transducer: Clamp-on, easy and convenience operating Display4 lines LCD display Output: Non-isolation RS232 (FUJI extended protocol)	5 pcs	1:5
72.	Refractometer	Type: DEF; Dimensions: 12" x 5.75" x 2.75"; Indicated: 32.5%; Scale: 0.5% line graduations; Waterline: 20 Deg. C	5pc	1:5
73.	Relay Test Set	Phase:0~360°,Accuracy:<0.5° Output frequency:0~1000Hz Frequency accuracy:0.01Hz Superimposed harmonics:0~20 Times	5 pcs	1:5
74.	Scan tool	Voltage:12V Power:5-15w Model Number:BT380 Warranty:3 Years, 3 Years Weight:0.6Kg Language: multi-language	5pcs	1:5
75.	Screwdrivers.	Material: Chrome Vanadium Steel Size: 160-260mm Weight:0.1kg Handle Material: Rubber	5set	1:5
76.	Socket wrench	: 1/4” and ½” socket wrench ,72 teeth ;ratchet with lever reverse ;DIN 3126;ISO 1173 ;59 pcs :1/4”: lever ratchet ,25mm angled extension ,150mm extension ,150mm flex extension ,cardan joint ,1/4”	5 set	1:5

		screw driver handle ,adapter quick -change chuck, socket wrench inserts (4,5,5.5,6,7,8,9,10,11,12,13,14); PH bits(PH 1,2,3);hexagon bits(3,4,5,6mm);TX bits (TX 10,15,20,25,27,30,40);slotted bit 0.8*5.5mm;1/2": lever ratchet;53mm angled extension ;125mm extension;1 cardan joint ;socket wrench inserts(10,11,12,13,14,15,16,1 7,18,19,20,21,22,23,24,25,26,2 7,28,30,32)		
77.	Soldering Equipment	Dimensions:25*24*14cm Weight (KG):3.1 KG Quality: High quality Blower fan: Brushless fan Air temperature range:150°C~500°C Soldering iron temp:200°C~480°C	5 pcs	1:5
78.	Stop watch	Display Methods: Digital Clock Power: Manual Mechanical Material: Plastic Calendar: Without Calendar Type: Digital, Movement Type: Step Movement	5 pcs	1:25
79.	**Test Pump， Water Pressure Test Pump Water Pipe Line Installation Heating System Water Leakage Pressure Tester Pump， Manual Push Testing Hand Tool**	Material: aluminum Pressure column outer diameter: 2.8cm / 1.10in, Pressure: 2.5MPa, Flow: 13ml / time, Weight: 2090g	5 pcs	1:5
80.	Thread chaser	A/C Thread Chaser	5 pcs	1:5
81.	Three – armed external and internal puller ,	Small : external clamping width 90 mm , min/max internal clamping width 90/ 140mm , spindle length	5pc	1:5

		140mm; medium: external clamping width 250mm , min/max 190/330mm , spindle length 280mm;large :external clamping width 520mm , min/max internal clamping width 250/600mm , spindle length 310mm; drop forged/Q&T steel cross-beam and universal hooks		
82.	Thresher	Production Capacity: According to model, Voltage:220v,Dimension(L*W*H):140*57.5*45 cm,Weight:50 KG, Threshing rate: 300-600 kg per hour	5 pcs	1:5
83.	Tire Mounting and Demounting Spoon	30" spoons; Spoon Type: Straight; Stock: 11/16" (17.5 mm)	1 pc	1:25
84.	Tool box	RBA24 Auto repair small cabinet incudes 149 tools	5 pcs	1:5
85.	Torque wrench:	Fine toothed ratchet heat (72 teeth);1*0-25Nm;1*25Nm,1*120-300; tip size ½”; accuracy +or -3%; scaling in Nm and lbf/ft.; complies with DIN EN ISO 6789:2003	5 pcs	1:25
86.	Torque wrench:	Fine toothed ratchet heat (72 teeth); 1*0-25Nm;1*25Nm,1*120-300; tip size ½”; accuracy +or -3%; scaling in Nm and lbf/ft; complies with DIN EN ISO 6789:2003.	2pcs	1:12.5
87.	Transportation carts	Loading ton: 10tn,axle number: 2, Brake :air type, structure: Dump	5 pcs	1:5

88.	Trolley car jack:	capacity:5 ton,10ton; conforms VBG-8 standard	5 pcs	1:5
89.	Tyre wrench (wheel Spyder) for tractor and heavy-duty vehicles;	drop forged C-V steel; size:27*30*32*3/4” square box; measurement :750*750mm	5Pc	1:5
90.	Vacuum Purge and Refill Kit	1 piece; Refill new coolant; Vacuum Gauge (43013-001-G): 0 - 30 inHg; Coolant Hose: 0.5" x 47" long;	1 pcs	1:25
91.	Water Meters	Material: Iron Type name: woltman cold water meter Installation: Horizontal Water temperature:≤30℃ Working pressure:≤1MPa Normal Size:80mm~200m	5 pcs	1:5
92.	Watering can	sturdy plastic; UV -resistant; volume 20 liters	5 pcs	1:5
93.	Wheel balancer	Material: sheet metal; Rim width: 20mm; Max wheel rate: 960mm; motor power: 0.2kw	1 pc	1:25
94.	Wheel block	truck parking block wheel chock block wheel car stopper truck wheel stopper Height (mm) :355 Width (mm) :204	5 pcs	1:5
95.	Wheel hanger pin	Set; safe removal; aluminum with knurled handle;	5 pcs	1:5
96.	Wheel spencer	3" front leveling lift kit; 10.9 or 12.9 grade bolts	5 pcs	1:5
97.	Winding Resistance Test Set	Measurement accuracy: ±(0.2%+2) Size:350mm*216mm*226mm Weight:8kgs Work power: AC 110V-400V±10% Work temperature:-10°C~ 50°C Environment humidity:≤85%RH Power frequency:50±1Hz	5 pcs	1:5
98.	Wire brush:	wooden handle, bristle length 25mm,6 rows, length 290mm	5pcs	1:5

99.	Wire Crimpers	stroke:30mm Power supply:220v / 50Hz / 60Hz Volume (Dimension):240*300*330 Weight:40kg Work efficiency:4500 times / hour	5	1:5
100.	Wire Stripper	Material: Stainless Steel, Steel, A3 Steel Type: Multi-functional Plier Tools Stripping Range: 12-24AWG/0.2-6mm² Terminal crimping: insulated/non-insulated terminals: insulated: 22-10AWG/1.5-6mm² Non-insulated: 12-10AWG/4-6mm², 16-14AWG/1.5-2.5mm², 22-18AWG/0.5-1mm²	5 pcs	1:5
101.	Wire Stripper	Material: Stainless Steel, Steel, A3 Steel Type: Multi-functional Plier Tools Stripping Range: 12-24AWG/0.2-6mm² Terminal crimping: insulated/non-insulated terminals: insulated: 22-10AWG/1.5-6mm² Non-insulated: 12-10AWG/4-6mm², 16-14AWG/1.5-2.5mm², 22-18AWG/0.5-1mm²	5 pcs	1:5
102.	Total station with accessories	Magnification: 30X Angle measurement accuracy: 2 seconds Ranging accuracy: 2+2ppm Range: 2.5km High speed ranging: 2s	5	1:5
103.	Compression tester	Dual Gauge Readings: 0~300psi,0~20KPaX100 - Flexible rubber hose length: 11.8 inches - Spark plug adapter diameter:	1	1:30

		14mm		
104.	Cylinder leakage tester	Manometer with two test pressure: 0 - 300 PSI / 0 - 21 kg / cm2. - Pressure gauge diameter: 75mm, four thread size: M10 x 1.0mm, M12 x 1.25mm, M14 x 1.25mm, M18 x 1.5mm. M16*1.5 - Hose overall length: 430mm, pressure tube length: 150mm, angled pressure tube length: 160mm.	5	1:5
105.	Power balance tester		5	1:5
106.	Exhaust gas analyzer	Power AC100~240V 50/60Hz or DC12V Power Consumption 40va Weight 12kg Specification 610 (L)X385(W)X265(H)mm	5	1:5
107.	Oscilloscope	Vertical System Analog Channel 8 Input Impedance Resistance: 1MΩ Input Sensitivity 10mV/div to 5V/div Input Coupling DC Resolution 12 bits Horizontal System Memory Depth 4K Max. Input 400V (DC+AC Peak) Real-Time Sampling Rate 2.4MSa/s Time BaseRange 1ns/div to 20000s/div(1-2-5sequences) Time Base Precision ±50ppm Trigger System Time Base Range 1ns/div to 20000s/div(1-2-5sequences) Time Base Precision ±50ppm Trigger Source CH1, CH2,CH3,CH4, CH5, CH6,CH7,CH8 Trigger Mode Edge X-Y Mode	5	1:5

		X-Axis Input CH1 Y-Axis Input CH2		
108.	Stethoscope	Material: Rubber & Plastic & Stainless Steel Probe Length: Approx. 22.5cm + 7cm 8.8"+ 2.7"	5	1:5
109.	Belt tensioner	Size: standard	5	1:5
110.	Lifting equipment	Lifting Capacity:3500-5000kg Material: Stainless Steel Lifting Time:50-60s Overall height:3674mm Weight:730kg Min height:120mm Voltage:110v/220v/240v/ 380v Optional Motor power:2.2kw	1	1:25
111.	Transmission pressure gauge set	Connector:14 Tee connectors,20 test connectors Pressure range:0 -60MPa Material: Stainless Steel Case	1	1:25
112.	Filler gage			
113.	Nozzle tester	Type: Engine Analyzer Voltage: Universal Power:0-400 bar	1	1:25
114.	Stroboscope (timing light)	Voltage:0-999 Power:12V Tachometer:9,990 RPM	1	1:25
115.	Engine analyzer	Condition: New, New100% Material: Steel Weight:5KG	1	1:25
116.	Pressure gauge	10-500 psi with rubber bumper and hose	5	1:5
117.	Blow gun	Zinc Alloy Gun with 30 degree	5	1:5

		angled aluminum nozzle and rubber tip		
118.	Leakage detector	Full set; operating temperature 0°C-40°C	5	1:5
119.	Inflator	With lock-on threads; 10 - 120 lb	5	1:5
120.	Air tank	**5-11 Gallon**	1	1:25
121.	Flow meter	Flow Measuring Range: 1-600 SLPS	5	1:5
122.	Flare	Combined 4.7 to 10mm; work on single and double	5	1:5
123.	plier	Set of tool made for installation of drum shoe return spring	1	1:5
124.	Adjustable pipe wrench:	1/2”-2”; CV-steel, ISO 8976	5 pcs	1:5
125.	Allen key	10pcs set;MM:0,7,0,9,1,27,1,5,2,0,2, 5,4,0,4,5,5,0,5,5,6,0,7,0,8,0,10, 0;inch:0.028,0.036,0.036,0.05, 1/16,5/64,3/32,7/64,1/8,9/64,5/ 32,3/16,7/32,1/4,5/16,3/8;DIN 911	1set	1:25
126.	Anti-slip slide screw wrench/adjustable spanner	Model Number:TYAS-1 Material:45# steel Max opening:350mm Character: normal Surface treatment: Polished Chrome Length:300mm	5set	1:5
127.	C-clamps:	length 280mm, jaw adjustment 10-70mm, heavy-duty CV-steel;	5pc	1:5
128.	Chain block	lifting capacity :3000kg; lifting Height :3m; tempered and galvanized chain according to EN818-7	1pc	1:25

129.	Mechanical tool set	Material: Metal; Dimensions: 55 x 39 x 26 cm / 21.65 x 15.35 x 10.24 inch; Content: Screwdrivers, Wrenches, Insulating Tape, Strippers, Terminals, Voltage Tester, Hex Keys, Pliers, Pick-Up Tool, Hammer, Utility Cutter, Cutter Blades, Measuring Tape, Level, Hand Saw, Tier Pressure Tester, Bits, Ratchet Bits Holder, Sockets Holder, Universal Joints, Extension Bars, Spark Plugs, Sockets, Fasteners.	Package Includes:258 x Pcs	1:25
130.	Combination wrench:	28 pieces; metric; DIN 3113A/ISO 3318/7738;5.5mm,6mm,7mm, 8mm,9mm,10mm,11mm,12mm,13mm,14mm,15mm,16mm, 17mm,18mm,19mm,20mm,21mm,22mm,23mm,24mm,25mm,26mm,27mm,28mm,29mm, 30mm,32mm,34mm,	1set	
131.	Double open-end wrench	12 pieces; metric; double -end; CV-steel; DIN 3110/ISO 1085;6*7mm,8*9mm,10*11mm,12*13mm,14*15mm,16*17mm,18*19mm,20*22mm,21*23mm,24*27mm,25*28mm,30*	1set	1:25

		32mm		
132.	Double ring wrench:	12 pieces; metric; double end; CV -steel; DIN 838 /ISO 3318 ;8*9mm,10*11mm,12*13mm,14*15mm,16*17mm;18*19mm,20*22mm,21*22mm,21*23mm,24*27mm,25*28mm,30*32mm	1set	1:25
133.	Grease gun with lever	volume 500gr grease (500cm^3), NLGI- Klass 2	5 pcs	1:5
134.	Hammer set:	machinists hammer, Germen type,300gr, length 300mm, DIN 1041, curved ash handle; sledged hammer, German type, steel head ,3000gr.600mm, DIN 1042, ash handle	5Set	1:5
135.	Heavy duty bottle -jack H- frame hydraulic press;	multi position bed; working range: max height:.> or = 800mm, max width:> or =550mm; bed opening :> or =120mm; ram dia.:45mm; safety: type-C-norm, DIN EN 693	1 pc	1:25
136.	High pressure cleaner	pressure 140-180bar; output max 400 L/integrated high-pressure hose with steel pressure pipe 1050mm.	5 pcs	1:5
137.	Impact Wrench	Power Supply Type: :AC Power Supply Voltage: 230V, torque:500nm	5pcs	1:5
138.	Lifting crane:	lifting capacity up to 2 ton; lifting height min 2m; EN 1494:2000+A:2008	5 pcs	1:5
139.	Lifting hook:	lifting capacity 2ton ,3 ton; complies with GS-OA 15-04-EN 1677	5 pcs	1:5
140.	Pressure tester	Test pressure:0 - 300 PSI / 0 -	5 pcs	1:5

		21 kg / cm^2, Weight:4.112kg, Size:46*10*34cm Test Unit/Mode: Bar, PSI Pressure gauge diameter:75mm thread size:M10 x 1.0mm, M12 x 1.25mm, M14 x 1.25mm, M18 x 1.5mm		
141.	Screwdrivers.	Material: Chrome Vanadium Steel Size: 160-260mm Weight:0.1kg Handle Material: Rubber	5set	1:5
142.	Socket wrench	1/4” and ½” socket wrench ,72 teeth ;ratchet with lever reverse ;DIN 3126;ISO 1173 ;59 pcs :1/4”: lever ratchet ,25mm angled extension ,150mm extension ,150mm flex extension ,cardan joint ,1/4” screw driver handle ,adapter quick -change chuck, socket wrench inserts (4,5,5.5,6,7,8,9,10,11,12,13,14); PH bits(PH 1,2,3);hexagon bits(3,4,5,6mm);TX bits (TX 10,15,20,25,27,30,40);slotted bit 0.8*5.5mm;1/2”: lever ratchet;53mm angled extension ;125mm extension;1 cardan joint ;socket wrench inserts(10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,30,32)	5 set	1:5
143.	Three – armed external and internal puller ,	Small : external clamping width 90 mm , min/max internal clamping width 90/ 140mm , spindle length 140mm; medium: external clamping width 250mm , min/max 190/330mm , spindle length 280mm;large :external	5pc	1:5

		clamping width 520mm , min/max internal clamping width 250/600mm , spindle length 310mm; drop forged/Q&T steel cross-beam and universal hooks		
144.	Torque wrench:	Fine toothed ratchet heat (72 teeth);1*0-25Nm;1*25Nm,1*120-300; tip size ½"; accuracy +or -3%; scaling in Nm and lbf/ft; complies with DIN EN ISO 6789:2003	5 pcs	1:25
145.	Transportation carts	Loading ton: 10tn,axle number: 2, Brake :air type, structure: Dump	5 pcs	1:5
146.	Trolley car jack:	capacity:5 ton,10ton; conforms VBG-8 standard	5 pcs	1:5
147.	Watering can	sturdy plastic; UV -resistant; volume 20 liters	5 pcs	1:5
148.	Bearing Puller	Surface treatment: Black Oxide Finish; Function: Repair Used; Application: Remove Bearing; Package: Metal Box; OEM: Acceptable; Keyword: bearing separator; Type: CAR HAND TOOLS; MATERIAL: Chrome Vanadium Steel.	5 set	1:5
149.	Oil Filter Wrench	4-piece Swivel Band Style ; 2538 - Heavy Duty Swivel Type Oil Filter Wrench - 57 mm-73 mm; 2540 - Heavy Duty Swivel Type Oil Filter Wrench - 65 mm - 83 mm; 2545 - Heavy Duty Swivel Type Oil Filter Wrench - 75 mm - 95 mm; 2548 - Heavy Duty Swivel	1set	1:25

		Type Oil Filter Wrench - 92 mm - 111 mm;		
150.	Pressurized Oil Evacuator	Capacity: 18 gal; Reinforced dispensing hose doubles as a sight gauge to prevent overfilling Includes safety valve Fluid Types: Motor oils, transmission fluids, power steering fluids 18 gal. Tank includes a preset air regulator that allows the use of standard shop air up to 150 PSI. 14" telescoping bowl with a height adjustment range of 45 - 72"	5pcs	1:5
151.	Oil pressure gauge	Applicable Models: universal Combination: oil/fuel pressure tester test pressure:0 - 300 PSI / 0 - 21 kg / cm2 Weight:4.112kg Size:46*10*34cm Pressure gauge diameter:75mm Thread size:M10 x 1.0mm, M12 x 1.25mm, M14 x 1.25mm, M18 x 1.5mm	5set	1:5
152.	pressure testing	steel with bronze plate Dial: 1.5"	1	1:25
153.	Injection pump test stand	Portable flat stand	1	1:25
154.	Nozzle tester	High volt injector	5	1:5

4. Developers Profile

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