REPUBLIC OF KENYA

COMPETENCY BASED MODULAR CURRICULUM

FOR AGRICULTURAL ENGINEERING
KNQF LEVEL 5

(CYCLE 3)

PROGRAMME ISCED CODE: 0716 454 A

TVET CDACC
P.O. BOX 15745-00100 NAIROBI

UNIT CODE: 0716 451 03A

TVET CDACC UNIT CODE: ENG/OS/AGR/CR/01/5/MA

UNIT DURATION: 280 Hours

Relationship to Occupational Standards

This unit addresses the unit of competency: Operate farm tractor

Unit Description

This unit specifies the competencies required by an Agricultural Engineering Craftsperson to operate farm tractor. It involves inspecting farm tractor systems, harnessing farm tractor power, service and maintenance of farm tractor systems and repairing farm tractor systems.

Summary of Learning Outcomes

S/No	Learning Outcomes	Duration (Hours)
1.	Inspect farm tractor systems	120
2.	Harness farm tractor power	80
3.	Service and maintain tractor systems	40
4.	Repair farm tractor systems	40
TOTAL		**280**

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1 Inspect farm tractor systems	1.1 Types of tractors e.g. 1.1.1 Small 1.1.2 Large 1.2 Tractor system e.g. 1.2.1 Steering 1.2.2 cooling 1.2.3 Fuel 1.2.4 Air	• Practical • Project • Portfolio of evidence • Third party report • Written tests

Learning Outcome	Content	Suggested Assessment Methods
	1.2.5 Lubrication	• Oral questioning
	1.2.6 Electrical	
	1.2.7 Ignition	
	1.2.8 Transmission	
	1.2.9 Braking	
	1.2.10 Hydraulic	
	1.3 Components of tractor dashboard and instrument panels	
	1.4 Tractor controls and levels	
	1.5 Different parts of tractor engine	
	1.6 Procedure for checking oil and coolant level	
	1.7 Maintenance of appropriate inflation pressure in front and rear tractor tyres	
	1.8 Safety precautions when operating a tractor	
	1.9 Tractor implement matching	
	1.10 Procedure of operating a tractor	
	1.10.1 Place gearshift lever in neutral	
	1.10.2 Place all hydraulic controls in neutral	
	1.10.3 Disengage PTO	
	1.10.4 Apply breaks	
	1.10.5 Depress the clutch pedal	
	1.10.6 Ignite	
	1.10.7 Reverse	
	1.10.8 Turning	
2 Harness Farm Tractor Power	2.1 Implements and trailers 2.2 Types of hitching e.g. 2.2.1 1-Point hitch	• Practical • Project

Learning Outcome	Content	Suggested Assessment Methods

	2.2.2 3-Point hitch
	2.3 Tools and equipment for tractor hitching and unhitching
	2.4 Procedure of hitching an implement e.g.
	    2.4.1 Reverse the tractor
	    2.4.2 Lower the lower links
	    2.4.3 Connect the left lower link
	    2.4.4 Connect the right lower link
	    2.4.5 Connect the top link
	2.5 Tractor power transfer.
	    2.5.1 PTO
	    2.5.2 Drawbar
	    2.5.3 Three-point hitch
	2.6 Types of PTO shafts e.g.
	    2.6.1 Transmission
	    2.6.2 Live clutch
	    2.6.3 Independent
	2.7 Types linkages e.g.
	    2.7.1 Drawbar
	    2.7.2 Three-point linkage
	2.8 Procedure of harnessing PTO tractor power e.g.
	    2.8.1 Start the tractor
	    2.8.2 Reverse the tractor towards the implement
	    2.8.3 Hitch the implement
	    2.8.4 Connect the implement to the tractor PTO
	    2.8.5 Engage the PTO
		• Portfolio of evidence
		• Third party report
		• Written tests
		• Oral questioning

Learning Outcome	Content	Suggested Assessment Methods

3 Service and maintain farm tractor systems	3.1 Types of maintenance
	    3.1.1 Preventive
	    3.1.2 Routine
	3.2 Preventive service and maintenance e.g.
	    3.2.1 Greasing
	    3.2.2 Changing oil
	    3.2.3 Tightening loose bolts and nuts
	3.3 Routine tractor maintenance tasks e.g.
	    3.3.1 Visual inspections
	    3.3.2 Radiator fluid level
	    3.3.3 Fan belt tension
	    3.3.4 Fuel level
	    3.3.5 Tractor oil level
	    3.3.6 Tractor tire pressure
	    3.3.7 Air filter
	    3.3.8 Checking oil level
	3.4 Predictive Maintenance using AI:
	    3.4.1 Data Collection and Sensors
	    3.4.2 Data Processing and Analysis
	    3.4.3 Machine Learning Models
	    3.4.4 Fault Diagnosis and Prediction
	    3.4.5 Maintenance Scheduling and Optimization
	    3.4.6 Cloud Computing and Edge Analytics
		• Practical
		• Project
		• Portfolio of evidence
		• Third party report
		• Written tests
		• Oral questioning

Learning Outcome	Content	Suggested Assessment Methods
	3.4.7 Integration with Farm Management Systems 3.4.8 User Interface and Alerts	
4 Repair farm tractor systems	4.1 Tractor system faults e.g. 4.1.1 Overheating 4.1.2 Running cold 4.1.3 Running hot 4.1.4 Damaged spark plugs 4.1.5 Excessive noise 4.1.6 Difficulty in starting 4.1.7 Failed brakes 4.1.8 High fuel consumption 4.2 Methods of diagnosing tractor faults e.g. 4.2.1 Tool 4.2.2 Instrument Panel 4.3 Fuel Efficiency Optimization using AI systems. 4.3.1 data analysis 4.3.2 predictive modelling 4.3.3 real-time adjustments.	• Practical • Project • Portfolio of evidence • Third party report • Written tests • Oral questioning

Suggested Methods of Delivery

- Demonstration
- Projects
- Group discussion
- Direct instructions

Recommended Resources for 25 Trainees

S/No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Item: Trainee)
A	**Learning Materials**			
	Projector		1	1:25
	Scientific calculators		25	1:25
	Farm tractor manual		1	1:25
	Computer with internet and		1	1:25
B	**Learning Facilities & infrastructure**			
	Classroom	40 M^2	1	1:25
C	**Consumable materials**			
	Stationery	Assorted	1 rim of printing papers 1 packet of pens 1packet of maker pens	1:25
D	**Tools and equipment**			
	Diesel testing kit			
	Wheel tractor			
	Tillage equipments (mouldboard, disc plough, chisel, harrow)		1 each	1:25
	Toolbox		2	1:25