

2425/104  
AGRICULTURAL ENGINEERING I  
Oct./Nov. 2022  
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AGRICULTURE

MODULE I

AGRICULTURAL ENGINEERING I

3 hours

**INSTRUCTIONS TO CANDIDATES**

*You should have the following for this examination:*

*Answer booklet;*

*Drawing instruments;*

*Non-programmable scientific calculator.*

*This paper consists of THREE sections; A, B and C.*

*Answer a total of FIVE questions, taking at least ONE question from each section.*

*All questions carry equal marks.*

*Maximum marks for each part of a question are indicated.*

*Candidates should answer the questions in English.*

**This paper consists of 3 printed pages.**

**Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

## SECTION A

Answer at least ONE question from this section.

1. (a) Sketch and label the parts of a micrometer screw gauge. (8 marks)
- (b) Using a sketch, explain how a reading of 1.90 mm is read from a micrometer screw gauge. (6 marks)
- (c) Determine the reading of the vernier caliper shown in figure 1. (6 marks)

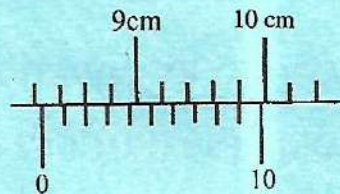


Fig. 1

2. (a) State five precautions to be observed when using gas welding equipment. (5 marks)
- (b) Sketch and label the components of the oxy-acetylene welding equipment. (9 marks)
- (c) Illustrate two gas welding techniques. (6 marks)

## SECTION B

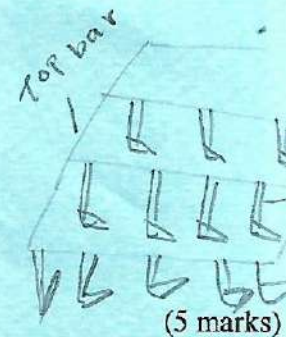
Answer at least ONE question from this section.

3. (a) State four disadvantages of using wood as a source of power in the farm. (4 marks)
  - (b) Differentiate between a two stroke cycle and four stroke cycle spark ignition engine. (10 marks)
  - (c) Illustrate the engine air cleaning system of a farm tractor. (6 marks)
4. (a) Using a labelled diagram, explain the operation of a tractor differential unit. (16 marks)
  - (b) Outline four functions of a differential lock in a tractor. (4 marks)
5. (a) Using a labelled diagram, explain the operation of hydraulic drum brakes. (14 marks)
  - (b) Outline three methods of actuating a tractor braking system. (6 marks)

✓ it pollutes environment by producing smoke  
✓ it is not a reliable source of power.  
✓ it is affected by weather condition  
- produces less power as compared to other sources.

### SECTION C

Answer at least ONE question from this section.



6. (a) Highlight **five** reasons for ploughing agricultural land. (5 marks)
- (b) With the aid of a diagram, explain the design features of a chisel plough. (12 marks)
- (c) State **three** adjustments carried out on a chisel plough. (3 marks)
7. (a) List **two** methods of calibrating planters. (2 marks)
- (b) Calculate the seed rate per hectare, given the following results obtained from calibration of a seed drill:
- Number of furrows: 15
  - Spacing between furrows: 20 cm
  - Diameter of drive wheel: 2 m
  - Revolutions of ground wheel recorded for seed delivery: 300
  - Seeds collected: 30 kg
- (9 marks)
- (c) Calculate the cost of sowing one hectare of land with an oxen drawn seed drill of size 5 x 20 cm, given the following:
- Speed of the oxen is 5 km/hr;
  - Hire charges for oxen is Ksh 1000 per pair per day;
  - Hire charges for the seed drill is Ksh 500 per day;
  - Wages for the operator is Ksh 1000 per day of 8 hours.
- (9 marks)
8. (a) Draw a diagram showing the main parts of a hand operated knapsack sprayer. (8 marks)
- (b) Explain **four** ways of varying application rate of a boom sprayer. (8 marks)
- (c) State **four** maintenance requirements of a sprayer. (4 marks)

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