

2425/104
AGRICULTURAL ENGINEERING I
June/July 2017
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.*

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) With the aid of a labelled diagram, illustrate the function of a taper drift. (10 marks)
- (b) A through hole of diameter 35 mm is to be drilled on a workpiece of thickness 50 mm. The spindle speed of the drilling machine is 4200 r.p.m.
 - (i) Calculate the cutting speed of the drill. (5 marks)
 - (ii) If the feed rate is 0.1 mm per second, calculate the time taken to drill the hole in minutes. Take $\pi = \frac{22}{7}$. (5 marks)
2. (a) Draw a labelled diagram of an oxy-acetylene gas welding torch. (8 marks)
- (b) With the aid of labelled diagrams, describe **three** types of oxy-acetylene gas welding flames. (12 marks)

SECTION B

Answer at least ONE question from this section.

3. (a) Outline the procedure of hitching a 3-point linkage implement onto a tractor. (8 marks)
- (b) Explain the **three** functions of hydraulic implement control systems of farm tractors. (12 marks)
4. (a) List the sequence of events that occur in a 4-stroke cycle engine cylinder during operation. (4 marks)
- (b) With the aid of labelled diagrams, explain the operation of a 2-stroke cycle spark ignition engine. (16 marks)
5. (a) Give any **five** disadvantages of using hydro-electric power on farms. (5 marks)
- (b) Discuss the factors to be considered in the selection of draft animals. (15 marks)

SECTION C

Answer at least ONE question from this section.

6. With the aid of a labeled diagram, explain the operation of a grain combine harvester. (20 marks)
7. (a) Outline any **four** maintenance requirements for crop dusters. (6 marks)
- (b) With the aid of a labelled diagram, explain the operation of a picker-pin seed drop mechanism used on potato planters. (14 marks)
8. (a) Draw a labeled layout of a tractor mounted boom sprayer. (8 marks)
- (b) Outline **four** factors that determine the application rate of crop sprayers. (6 marks)
- (c) A ground sprayer is fitted with 16 nozzles at a spacing of 250 mm. After spraying a distance of 100 m in 60 seconds, 9 litres of pesticide solution had to be refilled in the sprayer tank:
- (i) calculate the effective spraying width;
- (ii) calculate the test area;
- (iii) determine the application rate. (6 marks)

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