

2425/104
AGRICULTURAL ENGINEERING I
Oct./Nov. 2011
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.*

*This paper consists of **THREE** sections; A, B and C.
Answer **FIVE** questions in total; taking at least **ONE** question from each section.
Maximum marks for each question are indicated.*

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 the following workshop tools:
- (i) Angle plate;
 - (ii) Surface plate;
 - (iii) Try square;
 - (iv) Odd leg callipers.
- (8 marks)
- (b) State any **four** safety precautions to be observed when drilling. ✓
- (4 marks)
- (c) Illustrate the features of a twist drill. ✓
- (4 marks)
- (d) Explain the function of the following cutting tool angles:
- (i) Clearance; ✓
 - (ii) Rake. ✓
- (4 marks)
2. (a) Illustrate the **three** frames used in oxyacetylene gas welding and state an application for each. ✓
- (9 marks)
- (b) Describe the closing down procedure for the oxyacetylene welding equipment. ✓
- (7 marks)
- (c) Illustrate the following arc welded joints:
- (i) Tack; ✓
 - (ii) Lap; ✓
 - (iii) Fillet; -
 - (iv) Single V-butt. ✓
- (4 marks)

SECTION B

Answer at least ONE question from this section.

3. (a) (i) Outline the function of the steering system of a tractor. ✓
- (ii) List any **two** types of steering boxes used on a tractor. ✓
- (4 marks)
- (b) With the aid of a diagram, explain the operation of the power steering system used on a tractor. ✓
- (16 marks)

4

- (a) Explain the functions of the following engine parts:
- (i) Fly wheel; ✓
 - (ii) Connecting rod; ✓
 - (iii) Crankcase; ✓
 - (iv) Cylinder. ✓
- (4 marks)
- (b) Illustrate the overhead valve operating mechanism of a tractor engine. (6 marks)
- (c) With the aid of a diagram, explain the operation of a two-stroke cycle spark ignition engine of a tractor. (10 marks)

5.

- (a) Explain the uses of the following hydraulic systems.
- (i) Position control; ✓
 - (ii) Draft control. ✓
- (6 marks)
- (b) Using a diagram, explain the operation of a closed centre hydraulic system. (14 marks)

SECTION C

Answer at least ONE question from this section.

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- (a) State any four reasons for ploughing land. (4 marks)
- (b) Illustrate the features of a mouldboard plough. (8 marks)
- (c) Describe any two operational adjustments carried out on the following machines:
- (i) Rotary cultivator;
 - (ii) Disc harrows. ✓
- (8 marks)

7

- (a) With the aid of a diagram, illustrate the crop flow through a pickup baler. (12 marks)

- (b) Describe the knot tying mechanism of a pickup baler. (8 marks)

8

- (a) Sketch the layout of a tractor mounted crop sprayer. (8 marks)
- (b) Describe a calibration procedure for a boom sprayer. (12 marks)