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AGRICULTURAL ENGINEERING I  
June/July 2010  
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;*
- Mathematical table/Non-programmable scientific calculator;*
- Drawing instrument.*

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



**This paper consists of 4 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) Outline a first aid procedure for rescuing a person who has fainted while working in a workshop. (5 marks)
- (b) Determine the height to which the vernier height gauge could be set to mark each of the lines X - X and Y - Y shown in figure 1. (6 marks)

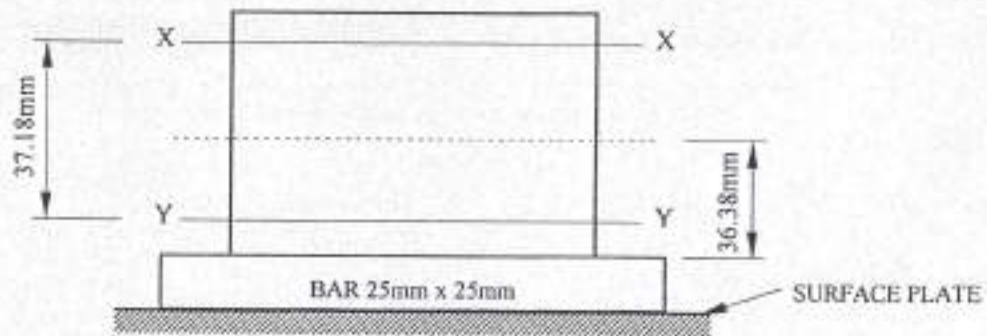


Figure 1

- (c) Sketch and state one use of each of the following tools:
- try square;
  - flat scraper;
  - hack saw. (9 marks)
2. (a) Explain the following gas welding problems stating any two possible causes for each:
- back firing;
  - flash back. (6 marks)
- (b) Using sketches describe the following welding techniques:
- left ward;
  - right ward. (10 marks)
- (c) Outline the procedure for switching off a gas welding equipment. (4 marks)

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## SECTION B

*Answer at least ONE question from this section.*

3. (a) State any **four** advantages of reducing the material size of animal feeds. (4 marks)
- (b) Describe the construction and principles of operation of the following:
- (i) hammer mill;
  - (ii) plate mill. (12 marks)
- (c) State any **four** maintenance requirements of a hammer mill. (4 marks)
4. (a) With the aid of a sketch explain the operation of a cylinder type forage harvester. (16 marks)
- (b) State any **four** safety precautions to be observed when operating the machine in question 4(a). (4 marks)
5. (a) Explain the following hitching terms:
- (i) centre of draft;
  - (ii) centre of power;
  - (iii) line of draft. (6 marks)
- (b) Describe **two** methods of ploughing using a one-way tractor mounted mouldboard plough. (8 marks)
- (c) A three bottom mouldboard plough is ploughing at a depth of 18cm in a soil that offers a resistance of  $2\text{N/cm}^2$ . Calculate the total draft of the plough if the ploughing width of one bottom is 200mm. (6 marks)





## SECTION C

*Answer at least ONE question from this section.*

6. (a) With the aid of a sketch explain the operation of an oil bath air cleaner. (10 marks)
- (b) Outline any **six** maintenance requirements for the air cleaner in question 6(a). (6 marks)
- (c) State any **two** possible causes for each of the following engine lubrication problems:
- (i) too high engine oil pressure;
- (ii) too low engine oil pressure. (4 marks)
7. (a) (i) Describe the construction and operation of a tractor three point linkage. (14 marks)
- (ii) Outline any **three** advantages of using a tractor three point linkage. (6 marks)
- (b) Describe the features of the two standard tractor PTO stub shafts. (6 marks)
8. (a) Outline why human and animal powered implements are preferred in Kenyan agricultural sector. (6 marks)
- (b) With the aid of sketches explain the operation of a two stroke cycle spark ignition engine. (14 marks)

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