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2425/304
AGRICULTURAL ENGINEERING III
AND ENVIRONMENTAL MANAGEMENT
Oct./Nov. 2018
Time: 3 hours

3 copies (per filing)

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AGRICULTURE

MODULE III

AGRICULTURAL ENGINEERING III AND ENVIRONMENTAL MANAGEMENT

3 hours

11 JAN 2019

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
- *Answer booklet;*
- *Drawing instruments;*
- *Non-programmable scientific calculator.*

*This paper consists of **TWO** sections; A and B.*
*Answer any **THREE** questions from section A and any **TWO** questions from section B in the answer booklet provided.*
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.

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SECTION A (60 marks)

*Answer any **THREE** questions from this section.*

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1. (a) Describe each of the following soil erosion control measures:

   (i) buffer strips;
   (ii) wash tops;
   (iii) companion cropping.

   (12 marks)

   (b) Outline the procedure for laying out farm terraces. (8 marks)

2. (a) A crop with a root zone depth of 1.0 m is to be grown in a sandy soil. Determine the soil moisture holding capacity, given that:

Field capacity	=	33%;
Wilting point	=	23%;
Dry soil density	=	1123.3 kg/m^3;
Density of water	=	1000 kg/m^3.

   (4 marks)

   (b) The moisture holding capacity of a certain soil is 150 mm per metre depth. Irrigation is to start at 55% moisture holding capacity with a peak rate for a moisture of 1 mm per day. If a crop with a 0.6 m root zone depth is to be grown, determine the:

   (i) depth of irrigation water;

   (ii) irrigation interval.

   (8 marks)

   (c) Explain any **four** reasons for determining the amount of water available at source during irrigation planning. (8 marks)

3. (a) Outline any **four** factors considered when selecting a land drainage method. (4 marks)

   (b) Illustrate the following land drainage methods stating the appropriate application of each:

   (i) French drains;
   (ii) gridiron drains;
   (iii) herringbone drains.

   (12 marks)

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(c) A drainage channel discharges 20 cubic metres of water per second from an area of 400 hectares. Determine the depth of water drained in metres in one day. (4 marks)

4. (a) Outline any **four** factors considered in the selection of a water pump for domestic use. (8 marks)

(b) With the aid of a labelled diagram, explain the working principle of an air lift water pump. (12 marks)

5. (a) Define each of the following water supply terms:

(i) contaminated water;
(ii) polluted water;
(iii) portable water. (3 marks)

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(b) State **five** causes of odour and taste in water. (5 marks)

(c) Describe **three** sources of ground water. (12 marks)

SECTION B (40 marks)

*Answer any **TWO** questions from this section.*

6. (a) Highlight any **four** sources of farm waste water. (4 marks)

(b) Outline **four** effects of improper disposal of waste water in Kenya. (6 marks)

(c) Explain any **five** benefits of monitoring water quality in Kenya. (10 marks)

7. Describe the role of the National Environmental Management Authority (NEMA) in Kenya. (20 marks)

8. (a) Outline any **four** guiding principles of environmental education. (8 marks)

(b) Describe the environmental impact assessment process. (12 marks)

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