

2425/304

AGRICULTURAL ENGINEERING III AND  
ENVIRONMENTAL MANAGEMENT

June/July 2018

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AGRICULTURE

MODULE III

AGRICULTURAL ENGINEERING III AND ENVIRONMENTAL MANAGEMENT

3 hours

**INSTRUCTIONS TO CANDIDATES**

*You should have the following for this examination:*

*Non-programmable scientific calculator;*

*Drawing instruments;*

*Answer booklet.*

*This paper consists of TWO sections; A and B.*

*Answer any THREE questions from section A and any TWO questions from section B.*

*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 (60 marks)

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

1. (a) Outline **three** factors considered in the classification of wells. (6 marks)
- (b) With the aid of a labelled diagram, describe a cavitation well. (8 marks)
- (c) Draw a sectional view of a dug well showing the constructional details. (6 marks)
2. (a) Give any **five** disadvantages of irrigation. (5 marks)
- (b) A rectangular basin measuring 100 m by 50 m is to be irrigated. The following information is available:
  - the depth of root zone of the crop to be established is 1.5 m;
  - the soil is homogeneous to the full depth of the plant root zone;
  - the field capacity of the soil is 20% and the wilting point is 10% wet basis;
  - the soil bulk density is 1500 kg/m<sup>3</sup>;
  - the density of water is 1000 kg/m<sup>3</sup>;
  - irrigation water is to be applied as soon as 60% of the available moisture content has been used;
  - the daily crop water requirement is 5 mm;
  - assume surface irrigation is to be used when the system efficiency is 80%.

Determine:

- (i) net water requirement;
- (ii) gross water requirement;
- (iii) irrigation interval;
- (iv) amount of water in cubic metres required to cover the whole field.

(15 marks)

3. (a) State any **four** reasons for water treatment. (4 marks)
- (b) Describe the following methods of treating domestic water:
  - (i) coagulation;
  - (ii) disinfection.

*Handwritten notes: Coagulation: Alum, Ferric chloride, Lime. Disinfection: Chlorination, Boiling, UV, Ozonation.*
- (c) Outline any **four** factors considered when locating a water distribution reservoir. (4 marks)
4. (a) Describe any **five** types of land conditions that will require drainage in order to achieve a high level of agricultural productivity. (10 marks)

*Handwritten notes:*  
 - screening  
 - coagulation  
 - Amalgam  
 - Irrigation  
 - Spacing  
 - Reservoir  
 - drainage  
 - classro-



- (b) With the aid of sketches, describe the following methods of land drainage:
- (i) herringbone;  
(ii) gridiron. (10 marks)
5. (a) Explain any **four** effects of vegetation on soil erosion. (8 marks)
- (b) Draw a cross-sectional view of an excavated bench terrace to illustrate the principle of 'cut and fill'. (6 marks)
- (c) Calculate the vertical interval between bench terraces given the following conditions:
- assumed width of bench is 4.5 m;
  - the slope of the terrace face is 1:1;
  - average slope of the land is 20%. (6 marks)

**SECTION B (40 marks)**

*Answer any TWO questions from this section.*

6. (a) Discuss the types of liquid wastes and their effects on the environment. (14 marks)
- (b) Outline any **six** control measures for liquid waste pollution. (6 marks)
7. (a) Explain any **five** roles of a proponent in an environmental impact assessment process. (10 marks)
- (b) Using a flow chart, illustrate the environmental impact assessment process. (10 marks)
8. Describe the phases of a project life cycle. (20 marks)

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