

2425/101  
PRINCIPLES OF CROP PRODUCTION I  
AND SOIL SCIENCE  
Oct/Nov. 2022  
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AGRICULTURE

MODULE I

PRINCIPLES OF CROP PRODUCTION I AND SOIL SCIENCE

3 hours

#### INSTRUCTIONS TO CANDIDATES

*You should have the following for this examination:*

*Answer booklet;*

*Non programmable scientific calculator.*

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

*Answer any THREE questions in section A and any TWO questions in 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 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 (60 marks)**

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

1. (a) Describe nematode infestation in crops under the following:
- (i) damage and symptoms;
  - (ii) control. (10 marks)
- (b) (i) Define the term 'apomixis',
- (ii) Explain **four** types of apomixis. (10 marks)
2. (a) Highlight **three** advantages and **three** disadvantages of small scale farming system. (6 marks)
- (b) Outline the principles of crop rotation. (6 marks)
- (c) Explain zero-tillage under the following:
- (i) meaning;
  - (ii) benefits. (8 marks)
3. (a) Describe layering method of crop propagation under the following:
- (i) meaning;
  - (ii) importance. (6 marks)
- (b) Describe alley cropping system of agroforestry. (6 marks)
- (c) Maize is planted at a spacing of 75 cm by 25 cm in one hectare of land. Given the following information:
- 100 seeds of maize = 37.5 g  
Germination percentage = 85%  
One seed is planted per hole.
- Determine the seed rate in kilogrammes per hectare. (8 marks)

4. (a) Highlight six characteristics of agricultural produce. (6 marks)
- (b) With reference to seed quality, highlight characteristics of the following:
- (i) physical purity;
- (ii) physiological quality. (6 marks)
- (c) Highlight the role of Kenya Plant Health Inspectorate Service (KEPHIS) in seed certification. (8 marks)
5. (a) The fertilizer rate for planting a particular crop is given as 90 kg  $P_2O_5$ /ha. Determine:
- (i) the amount of DAP (18:46:0) fertilizer applied in one acre of land during planting. (6 marks)
- (ii) the amount of nitrogen that is contained in DAP fertilizer applied in one acre of land during planting. (3 marks)
- (b) Outline the procedure of preparing silage using the trench silo. (11 marks)

**SECTION B (40 marks)**

*Answer any TWO questions from this section.*

6. (a) Highlight the properties of the following soils:
- (i) sandy soils;
- (ii) clayey soils. (10 marks)
- (b) A soil sample weighing 800 g contains 180 g of moisture when 51% of the pore spaces are full. Given that:
- Particle density = 2.65 g/cm<sup>3</sup>
- 1 cm<sup>3</sup> of water = 1 g
- Determine the porosity of the soil sample. (10 marks)

7. (a) Describe biological weathering of rocks. (6 marks)
- (b) Differentiate between new comprehensive system and soil world map system of soil classification. (6 marks)
- (c) The following equations shows one of the biochemical processes in soil.  
 $(NH_4)_2SO_4 + O_2 \longrightarrow$
- (i) Complete and balance the equation.
- (ii) Explain the process. (8 marks)
8. (a) Explain percent base saturation under the following:
- (i) meaning;
- (ii) significance. (6 marks)
- (b) Explain **three** factors that influence cation adsorption on colloidal complex. (6 marks)
- (c) (i) Define the term 'biochemical sedimentary rocks'.
- (ii) State **six** properties of sedimentary rocks.  
*formed from consolidation & cementation of rocks* (8 marks)

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