

1903/103
AGRICULTURAL PRODUCTION AND
MICROBIOLOGY
Oct./Nov. 2019
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

**CRAFT CERTIFICATE IN FOOD PROCESSING AND PRESERVATION
TECHNOLOGY**

MODULE I

AGRICULTURAL PRODUCTION AND MICROBIOLOGY

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Non-programmable scientific calculator.

This paper consists of TWO sections; A and B.

Answer ALL the questions in section A and any TWO questions from section B in the answer booklet provided.

Each question in section A carries 4 marks while each question in section B carries 20 marks.

Maximum marks for each part of a question are as shown.

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 **ALL** questions in this section.

1. Describe the sterilization for each of the following:
 - (a) petri-dish; (2 marks)
 - (b) culture media. (2 marks)
2. Distinguish between viable count and total count. (4 marks)
3. Explain the significance of each of the following:
 - (a) dilution; (2 marks)
 - (b) homogenisation. (2 marks)
4. (a) Define the term halophile. (1 mark)
(b) Identify the incubation temperatures for each the following types of bacteria. (3 marks)

Bacteria	Incubation temperature
Psychrophile	
Mesophile	
Thermophile	
5. State **four** indicators of growth in a liquid culture medium. (4 marks)
6. Explain **two** reasons for determining microbial pad in finished food product. (4 marks)
7. Draw the shapes of **four** bacterial colony outlines. (4 marks)
8. (a) Distinguish between prokaryotic and eukaryotic cells. (2 marks)
(b) State **two** advantages of mulching in crop production. (2 marks)
- Control weed.
9. (a) State **two** advantages of vegetative propagation over seed propagation. (2 marks)
- retain moisture
(b) State **two** advantages of green manure. (2 marks)
10. State **four** factors that influence the quality of milk. (4 marks)
11. Explain the use of sticky traps in controlling insect pests. (4 marks)
12. List **four** advantages of using herbicides in weed control. (4 marks)

13. (a) State **two** constituents of farmyard manure. (2 marks)
- (b) State **two** advantages of fertilizers. (2 marks)
14. State **four** advantages of artificial insemination for small holder dairy farmers. (4 marks)
15. Give **four** advantages of crop rotation. (4 marks)

SECTION B (40 marks)

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

16. (a) Explain the role of the following in gram stain procedure:
- (i) iodine; (2 marks)
 - (ii) safranin; (1 mark)
 - (iii) crystal violet. (1 mark)
- (b) (i) Draw the structure of **four** endospore distribution pattern within a bacterial cell. (4 marks)
- (ii) Explain the basis of acid fast staining procedure. (2 marks)
- (c) (i) State **four** sources of energy ingredients in formulating animal feed. (4 marks)
- (ii) Explain **three** advantages of feeding colostrum to new born animals. (6 marks)
17. (a) Explain **five** roles of microorganisms in the environment. (10 marks)
- (b) Explain **five** soil factors that may influence fertility. (10 marks)

18. (a) The composition of MacConkey broth is as shown in table I.

Table I

Ingredient	Quantity
Peptone	20.0 g
Lactose	10.0 g
Ox gall	5.0 g
Bromocresol purple	0.01 g
Distilled water	1000 ml

- (i) The medium is classified as selective. Explain. (2 marks)
- (ii) Explain the role of peptone. (2 marks)
- (ii) Explain why distilled water is preferred in culture media formulation. (2 marks)

- (b) State **four** applications of solid medium. (4 marks)
- (c) Discuss how each of the following ecological factors may affect crop production:
- (i) soil; (5 marks)
 - (ii) topography. (5 marks)
19. (a) 50 ml duplicates of a liquid food sample was diluted to 200 ml with sterile diluent. The resulting solution was passed over a membrane filter and subsequently examined after incubation and the count were recorded as 32 and 50 colony forming units.
- (i) Determine the microbial load per ml of the sample. (3 marks)
 - (ii) State **two** disadvantages of membrane filtration method. (2 marks)
 - (iii) Identify **five** aseptic precautions observed during membrane filtration procedure. (5 marks)
- (b) Explain the effect of each of the following storage factors on the post-harvest quality of crop produce:
- (i) temperature; (4 marks)
 - (ii) relative humidity; (3 marks)
 - (iii) atmospheric composition. (3 marks)

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