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.

Turn over

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	10 - 45°C
Mesophile	2 - 10°C
Thermophile	45 - 85°C

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)

9. (a) State two advantages of vegetative propagation over seed propagation. (2 marks)

   (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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