1903/203
FOOD ENGINEERING II
Oct./Nov. 2022
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

CRAFT CERTIFICATE IN FOOD PROCESSING AND PRESERVATION TECHNOLOGY

MODULE II

FOOD ENGINEERING II

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 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.

Turn over

SECTION A (60 marks)

Answer ALL the questions in this section.

1. State **four** features of glass which makes it a preferred material for food packaging. (4 marks)

2. Describe the electrostatic cleaning of food materials. (4 marks)

3. List **four** qualities of raw materials used as grading parameters. (4 marks)

4. Define each of the following: (2 marks)

   (a) size reduction; (2 marks)

   (b) critical speed of a trommel. (4 marks)

5. State **four** applications of filtration in food industry. (4 marks)

6. Differentiate between sorting and grading. (4 marks)

7. Name the mechanical forces applied in each of the following size reduction equipment:

   (a) buhr mill; (1 mark)

   (b) rod mill; (1 mark)

   (c) hammer mill; (1 mark)

   (d) crushing rolls. (1 mark)

8. Explain the application of vertical screw mixers in food industry. (4 marks)

9. One face of a 2 mm thick stainless steel metal plate is maintained at 80° C while the other at 25° C. If the rate of heat transfer per unit area is 4.675×10^5 J/s, calculate the thermal conductivity of the stainless steel plate. (4 marks)

10. Name **four** types of bulk elevators used in the food industry. (4 marks)

11. State **four** factors which affect the efficiency of spray washing of raw materials. (4 marks)

12. Explain the influence of moisture content of food on the choice of size reduction equipment. (4 marks)

13. State **four** main causes of variability in storage conditions in a cold room. (4 marks)

14. Name **four** equipment used in drying of food materials. (4 marks)

15. State **four** effects of heat processing of food materials. (4 marks)

SECTION B (40 marks)

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

16. (a) Name **four** basic components of a spray drier. (4 marks)

(b) Explain the use of drum driers in the food industry. (8 marks)

(c) Explain **four** factors which influence the efficiency of screening. (8 marks)

17. (a) State **five** qualities of a good filter medium. (5 marks)

(b) Describe **five** methods used in reducing the drop damage of raw materials. (10 marks)

(c) Explain the wet milling of cereals. (5 marks)

18. (a) State **five** advantages of plate heat exchanger. (5 marks)

(b) With the aid of labelled diagrams, differentiate between concurrent and counter current tubular heat exchangers. (6 marks)

(c) State **five** factors considered in the design and operation of bucket elevators. (5 marks)

(d) Differentiate between sedimentation and emulsification. (4 marks)

19. (a) Explain the purpose of controlling damages of food raw materials. (4 marks)

(b) Calculate the centrifugal force experienced by an object of mass 80 g inside a cylindrical bowl of 60 cm diameter rotating at 1800 revolution/minute. (6 marks)

(c) Explain **five** main functions of food packaging. (10 marks)

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