

1903/203  
FOOD ENGINEERING II  
June/July 2021  
Time: 3 hours

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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.**

## SECTION A (60 marks)

Answer **ALL** questions in this section.

1. State **four** advantages of handling materials as unit loads. (4 marks)
2. Name **four** types of bulk elevators in the food industry. (4 marks)
3. Calculate the rate of heat transfer through the wall of an oven whose surface area and thickness are  $2 \text{ m}^2$  and  $5 \text{ cm}$  respectively when the inner temperature is  $180^\circ\text{C}$  and the room temperature is  $20^\circ\text{C}$ . The thermal conductivity of the material making the wall is  $0.017 \text{ W/m}^\circ\text{C}$ . (4 marks)
4. State **four** applications of impeller agitation in the food industry.   
 *agitation* *four* (4 marks)
5. State **four** benefits of sorting food raw materials.   
 *four* (4 marks)
6. Differentiate between filtration and sedimentation processes.   
 *Filter media* *Sedimentation* or *flow* (4 marks)
7. Define each of the following:
  - (a) filter aids; (2 marks)
  - (b) filter medium.   
 *filter mechanism* (2 marks)
8. State **four** areas of application of centrifugation in the food industry.   
 *Separation of cream from milk* *ice cream* *edible films* (4 marks)
9. Name **four** types of materials used in packaging of food products.   
 *plastic* *metals* *paper* (4 marks)
10. State **four** advantages of adequate air circulation in the raw material storage rooms.   
 *avoid suffocation* *moisture build up* *adequate aeration* *Reduce clumpiness* (4 marks)
11. State **four** advantages of wet grinding of food raw materials.   
 *Holding of large volume of product* *provide agitation of product* *Convey food products* (4 marks)
12. Explain the use of drum driers in the food industry.   
 *Improper lighting* *ventilation* (4 marks)
13. State **four** unsafe acts in the food processing plant.   
 *Lifting of overweight pallets* *standing under overhead or pallets structure* (4 marks)
14. Highlight **four** qualities of glass that make it popular for packaging some food products.   
 *Resistant to corrosion* *Easy visibility* *Glass is easy to clean* *Do not provide permeability to oxygen & foreign material* (4 marks)
15. Using labelled diagrams, describe the basic types of emulsions formed from water and oil.   
 *filter aids* *Agg* *emulsion* *UHT milk* *stabilizing milk* *of can sat* *fold but* (4 marks)

## SECTION B (40 marks)

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

16. (a) Write the Stoke's law equation for the drag force defining each symbol. ✓ (5 marks)
- (b) Explain centrifugal separation of milk. ✓ (6 marks)
- (c) Describe each of the following methods of cleaning food raw materials:
- (i) Aspiration cleaning. ✓ (5 marks)
- (ii) Electronic cleaning. ✓ (4 marks)
17. (a) Define 'efficient materials handling'. ✓ (2 marks)
- (b) Explain **six** factors considered in the design and operation of chutes. ✓ (12 marks)
- (c) Explain the use of trucks in achieving high efficiency in the food processing plant. ✓ (6 marks)
- Transp.  
- Handling  
- Lifting.
18. (a) State **five** causes of variability in storage conditions inside a coldroom. (5 marks)
- (b) State **five** benefits of packaging food. ✓ (5 marks)
- (c) With the aid of a labelled diagram, explain the grinding of raw material in the food industry using a hammer mill. (10 marks)
- Weight load.  
- Nozzle s.  
- Hurdle  
- Pumps  
- Jets.
19. (a) Name **four** major components of a spray drier. (4 marks)
- (b) State **four** undesirable changes during drying of food materials. (4 marks)
- Color  
- texture  
- shape  
- Flavor & Aroma.
- (c) Explain **three** reasons for carrying out evaporation during food processing. (6 marks)
- Reduce size  
- Stable product  
- Reduce moisture content
- (d) Describe **three** methods of exhaustion of cans before their closure. (6 marks)
- mechanical  
- physical exhaust  
- Chemical

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vacuum  
m & p  
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