2913/105
FOOD ENGINEERING I
Oct./Nov. 2019
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN FOOD SCIENCE AND PROCESSING TECHNOLOGY

MODULE I

FOOD ENGINEERING I

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 **15** marks while each question in section **B** carries **20** marks.*
Maximum marks for each part of a question are as indicated.
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. (a) List **five** legislations on waste management and pollution control in Kenya. (5 marks)

   (b) State the industrial colour codes for each of the following:

   (i) electrical pipe; (1 mark)
   (ii) cold water pipe; (1 mark)
   (iii) steam pipe; (1 mark)
   (iv) hot water pipe. (1 mark)

   (c) Explain the principles of hygienic equipment design in food factories. (6 marks)

2. (a) State **three** uses of water in a food industry. (3 marks)

   (b) Name **four** classes of water used in food industry, giving **two** quality requirements of each class. (12 marks)

3. (a) Explain the importance of safety in a food processing plant. (4 marks)

   (b) Discuss how an operator can guarantee personal safety while working in a food processing plant. (7 marks)

   (c) 1240 g of superheated steam in a boiler has a volume of 6800 cm^3 at 180 °C. Calculate the density of steam at the given temperature. (4 marks)

4. Describe each of the following methods of raw materials acquisition by a food factory:

   (a) tender method; (9 marks)

   (b) contract purchasing. (6 marks)

SECTION B (40 marks)

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

5. (a) Describe the components of total truck effort. (10 marks)

(b) Discuss the factors which determine the design and construction of a chute. (10 marks)

6. Discuss each of the following hygienic designs and construction of a food plant:

(a) floor design; (7 marks)

(b) ventilation design; (7 marks)

(c) walls and ceilings design. (6 marks)

7. (a) Draw a labelled diagram of a cold room cooling system. (4 marks)

(b) Discuss ways in which boiler efficiency can be enhanced for profitable boiler operations. (16 marks)

8. (a) A crushing roll has a reduction ratio of 2.2. If the product from the crushing roll is 0.34 mm, determine the size of raw material being fed into the crushing roll. (4 marks)

(b) Explain how each of the following factors govern equipment selection for size reduction:

(i) mechanical structure of feed; (4 marks)
(ii) moisture content of feed. (4 marks)

(c) Draw a labelled diagram of a hammer mill. (8 marks)

THIS IS THE LAST PRINTED PAGE.