

2913/202  
FOOD ANALYSIS AND  
QUALITY ASSURANCE  
Oct./Nov. 2021  
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL  
DIPLOMA IN FOOD SCIENCE AND PROCESSING TECHNOLOGY  
MODULE II

FOOD ANALYSIS AND QUALITY ASSURANCE

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 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* the questions in this section.

1. (a) Write the following abbreviations in full as used in the food industry:
  - (i) FAO; (1 mark)
  - (ii) ISO. (1 mark)
- (b) Differentiate between stratified sampling and cluster sampling. (4 marks)
- (c) 5.3 g of a sample required 60 mL of Karl Fischer's reagent which contains 3 g of iodine in 250 mL solution. Calculate the percent moisture content of the sample. (I = 127) (9 marks)
2. (a) Explain **three** applications of food analysis technique. (6 marks)
- (b) Outline the procedure for determination of butter fat in milk by Gerber method. (5 marks)
- (c) Determine the pH of 0.000026 M HCl solution. (4 marks)
3. (a) State **five** benefits of crude protein determination in food. (5 marks)
- (b) 3.6 g of a sample was digested for protein content determination. The digest was made up to 200 mL solution. 20 mL of the digest solution was steam distilled to produce ammonia which required 12.3 mL of 0.2 M HCl for neutralization. Calculate the protein content using a factor of 6.25. (6 marks)
- (c) Differentiate between quality assurance and quality control as used in the food industry. (4 marks)
4. (a) Define each of the following:
  - (i) qualitative analysis; (2 marks)
  - (ii) quantitative analysis. (2 marks)
- (b) Outline the procedure for the determination of total titratable acidity in a fruit jam as citric acid. (7 marks)
- (c) During dry ashing determination of a sample, the following data was obtained:  
Weight of the empty dish = 24.65 g;  
Weight of dish + sample = 26.36 g;  
Weight of the dish + sample after incineration = 24.79 g.  
  
Calculate the percentage total ash content of the food sample. (4 marks)



**SECTION B (40 marks)**

*Answer any TWO questions from this section.*

5. (a) State **four** functions of the Kenya Bureau of Standards (KEBS). (4 marks)
- (b) Explain the quality control in food processing in relation to each of the following:
- (i) raw material; (4 marks)
  - (ii) process control; (4 marks)
  - (iii) finished product. (3 marks)
- (c) Explain the concept of central limit theorem as applied in assurance. (5 marks)
6. (a) Explain the function of quality control department in the food industry. (8 marks)
- (b) State **seven** principles of Hazard Analysis Critical Control Points. (7 marks)
- (c) Explain the meaning of each of the following standards:
- (i) standards of identify. (2 marks)
  - (ii) standards of quality. (3 marks)
7. (a) Explain the principle of crude fat extraction by soxhlet method. (7 marks)
- (b) Using the data below, calculate the iodine value of the fat sample.
- Weight of fat sample = 0.35 g.  
Volume of 0.1 M  $Na_2S_2O_3$  for blank =  $48.8\text{ cm}^3$   
Volume of 0.1 M  $Na_2S_2O_3$  for sample =  $10.7\text{ cm}^3$   
(N = 23, S = 32, I = 126.9) (10 marks)
- (c) State the components of Wij's solution used in iodine value determination in fats and oils. (3 marks)
8. (a) Explain **four** properties of vitamin C which influence its method of determination. (4 marks)
- (b) Explain **two** reasons of adding phosphoric acid during titration in the determination of vitamin C. (4 marks)
- (c) 60 g of spinach leaves was blended with 3 times its weight of metaphosphoric acid and filtered. 25 mL of the filtrate required 13.5 mL of 2.6 dichlorophenol indophenol solution at the end point. Also, 25 mL of the solution containing 65 mg ascorbic acid required 15.8 mL of 2.6 dichlorophenol indophenol solution at the end point. Calculate the ascorbic acid content of the spinach leaves in mg/100 g of sample. (12 marks)

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