

2913/201
FOOD CHEMISTRY I AND
FOOD MICROBIOLOGY I
June/July 2021
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN FOOD SCIENCE AND PROCESSING TECHNOLOGY

MODULE II

FOOD CHEMISTRY I AND FOOD MICROBIOLOGY 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 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 pages are printed as indicated and that no questions are missing.

SECTION A (60 marks)

Answer ALL the questions in this section.

1. (a) State five functions of water in food. (5 marks)
- (b) (i) Define water activity. (2 marks)
- (ii) A food sample contains 27.64% and 27.36% of glutamic acid and sucrose respectively in solution. Calculate the water activity of the food given the following information. (8 marks)
- Specific gravity of the solution is equivalent to that of water.
 - There is no chemical reaction between the constituents.
 - Molecular formula of glutamic acid is $C_5H_9O_4N$.
 - Sucrose is a condensation product of glucose and fructose, both of which having molecular formula $C_6H_{12}O_6$. ($C = 12; H = 1; O = 16; N = 14$).
2. (a) State five advantages and five disadvantages of swabbing methods for the microbiological examination of samples. (10 marks)
- (b) State the advantages and disadvantages of most probable number (MPN) method of enumerating microorganisms. (5 marks)
3. (a) Describe four types of isomerisms in monosaccharides. (8 marks)
- (b) Explain the difference between maltose and sucrose in copper reduction tests. (3 marks)
- (c) Explain the development of hydrolytic rancidity in freshly extracted seed oil. (4 marks)
4. (a) Define coliforms. (2 marks)
- (b) Name the family of organisms to which coliforms belong. (1 mark)
- (c) Outline the sequence of culturing in the enumeration and identification of *Escherichia coli* in a food sample. (12 marks)

Collect sample
sterilize (autoclave 120°C 15 pascals) 15 min
let the sample cool.
inoculate the sample (dipper milk trolley)
incubate smear sample on slide
incubate
Take the slide to microseparator

SECTION B (40 marks)

Answer any TWO questions from this section.

5. (a) Explain the microbiological criterion of food. (3 marks)
- (b) Outline the procedure for detection and identification of viral hazards in food. (9 marks)
- (c) Describe sensory indicators of microbial spoilage of food. (8 marks)
lost odor, taste, texture, color change, appearance, softness of tissues, cloudiness in onions
6. (a) With the aid of a diagram, explain the typical titration curve of a protein. (14 marks)
- (b) (i) State three effects of protein denaturation; (3 marks)
- (ii) List six agents of protein denaturation. (3 marks)
7. (a) With the aid of a diagram, describe lipid autoxidation in bulk medium. (15 marks)
- (b) Explain the principle of iodine test on starch. (5 marks)
8. (a) Discuss the methods of controlling microorganisms in food. (18 marks)
sanitization, sterilization, antiseptics, filtration
- (b) Name four antibiotics used to control microorganisms in food. (2 marks)
iodine, benzalkonium chloride, chloroxone, sodium hypochlorite
penicillin, ampicillin, vancomycin, erythromycin
use of chemical, filtration, antibiotics, antiseptics, disinfectants

THIS IS THE LAST PRINTED PAGE.