



MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

SCHOOL OF AGRICULTURE, ENVIRONMENT AND HEALTH SCIENCES

DEPARTMENT OF AGRICULTURAL SCIENCES

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRIBUSINESS MANAGEMENT AND TRADE

AGB 417: PRINCIPLES OF FOOD PROCESSING AND PRESERVATION

DATE: 29/8/2022

TIME: 8.30-10.30 AM

INSTRUCTIONS: Answer question ONE and any other TWO questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Explain five factors that influence heat penetration during food sterilization. (5 marks)
- b) Explain the four stages of agribusiness value chain. (4 marks)
- c) Discuss the four general concepts of food processing. (8 marks)
- d) Explain the principles of food preservation under each of the following headings:
 - i. Prevention or delay of microbial decomposition. (4 marks)
 - ii. Prevention or delay of self-decomposition of food. (3 marks)
- e) A Dairy Processing Plant intends to produce yoghurt with a butterfat content of 3.0%. At its disposal is 2400 kg of fresh milk with a butterfat content of 2.4% and cream with butterfat content of 30%. Using first principles, calculate the weight of cream required to adjust and standardize the butterfat content of the fresh milk for yoghurt manufacture. (6 marks)

QUESTION TWO (20 MARKS)

- a) Maillard reaction, a non-enzymic browning reaction has both beneficial and detrimental effects on food processing operations:
 - i. Explain three hypotheses that have been put forward to explain non-enzymic browning during food processing. (3 marks)
 - ii. Explain two applications of Maillard reaction in food processing. (2 marks)
 - iii. Explain three reasons why it is important to control the Maillard reaction during food processing. (3 marks)
- b) Explain four principles governing the use of food additives in the food industry. (4 marks)
- c) Describe any four methods of food preservation. (8 marks)

QUESTION THREE (20 MARKS)

- a) Explain six practical reasons behind the manufacture and processing of fruit juice. (6 marks)
- b)
 - i. Explain six objectives of blanching. (6 marks)
 - ii. Explain how the adequacy of the blanching process is established. (4 marks)
- c) Explain the contributions that food processing and preservation may make towards achievement of any four of the United Nations Sustainable Development Goals. (4 marks)

QUESTION FOUR (20 MARKS)

- a) Explain five technical challenges that a potential entrepreneur intending to venture into juice manufacturing is likely to encounter (5 marks)
- b) A 10 ml sample of apple juice with a total soluble solids content of 16 °Brix was titrated with 0.1N NaOH, and to reach the end point a titer of 18.6 ml was obtained. Given that the conversion factor of the predominant organic acid in apple is 0.0067, answer the following questions:
 - i. Name the predominant organic acid in apple juice (1 mark)
 - ii. Calculate the % total titratable acidity in the apple juice (4 marks)
 - iii. Calculate the sugar:acid ratio in the apple juice (2 marks)
 - iv. Describe the other method that is used to determine titratable acidity in juices (3 marks)
- c) Describe the symbiotic collaborative growth of the yoghurt starter culture and the impact of such collaboration on the yoghurt quality (5 marks)

QUESTION FIVE (20 MARKS)

- a) Using liquid milk processing as a model food, answer the following questions:
 - i. Describe the six essential components of the High-Temperature-Short-Time (HTST) method of pasteurization (10 marks)
 - ii. Explain four effects of the pasteurization unit operation on milk (4 marks)
- b) Explain six reasons why in yoghurt manufacture, the yoghurt mix is subjected to much more severe heat treatment than conventional pasteurization temperature - time combination (6 marks)