MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRIBUSINESS MANAGEMENT AND TRADE

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (AGRIBUSINESS MANAGEMENT AND TRADE)

AGB 417: PRINCIPLES OF FOOD PROCESSING AND PRESERVATION

DATE: 19/8/2021 **TIME: 8.30-10.30 AM**

INSTRUCTIONS:
Answer **Question ONE** and **ANY TWO** other questions

QUESTION ONE (COMPULSORY - 30 MARKS)

a) Explain the **FOUR** main stages of agribusiness value chain (4 marks)

b) Explain the **FOUR** main concepts of food processing (8 marks)

c) 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)

d) Assume that you are the Agribusiness Manager at Cool Dairy Ltd and on a particular day you receive 2400kg of fresh milk with a butterfat content of 2.4% and cream with butterfat content of 30%. You are required to produce yoghurt with a butterfat content of 3.0%. Using first principle, calculate the weight of cream required to adjust and standardize the butterfat content of the fresh milk (6 marks)

e) Explain **FIVE** principles governing the use of food additives in the food industry (5 marks)

QUESTION TWO (20 MARKS)

a) Explain **SIX** practical reasons behind the manufacture and processing of fruit juice (6 marks)

b) Blanching is a thermal processing method commonly used in the fruits and vegetables processing industries:

i. Explain **SIX** objectives of blanching (6 marks)

ii. Explain how the adequacy of blanching is established (4 marks)

c) Explain **FOUR** factors that influence heat penetration during food sterilization (4 marks)

QUESTION THREE (20 MARKS)

a) Maillard reaction is one of the non-enzymic browning reactions that take place during food processing.

i. Explain **THREE** hypotheses that have been put forward to explain non-enzymic browning during food processing (3 marks)

ii. Explain the Maillard reaction as applied 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** roles of fermentation in food processing (4 marks)

c) Other than fermentation, describe **FOUR** methods of food preservation (8 marks)

QUESTION FOUR (20 MARKS)

a) In the processing of liquid foods such as fruit juice, milk, beer and wine, the products are subjected to thermal processing through the use of High-Temperature-Short-Time (HTST) method of pasteurization. Using milk processing as an example, 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 pasteurization 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)

QUESTION FIVE (20 MARKS)

a) Assume that you wish to venture into fruit juice manufacturing business. Explain **FIVE** main technical challenges that a potential entrepreneur like you is likely to encounter. (5 marks)

b) Assume that during titration 10 ml of apple juice with a total soluble solids content of 16 ^{o}Brix requires 18.6 ml of 0.1N NaOH to reach end point. Given that the conversion factor of the predominant organic acid in apple juice 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)

c) Describe the collaborative growth of the starter culture used in yoghurt manufacture (3 marks)

d) Assume that a dairy farmer with limited financial resources and from a rural area that is not well served by electricity approaches you with a proposal of an intention of adding value to his milk. He is torn between engaging in mala or yoghurt manufacture. From a business view point advise the farmer on the better option (5 marks)