



**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)
SCHOOL OF AGRICULTURE, VETERINARY SCIENCES AND
TECHNOLOGY (SAVET)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR**

**MAIN EXAMS
OF
BACHELOR OF BSC FOOD SCIENCE AND TECHNOLOGY**

COURSE CODE: APT 104

**COURSE TITLE: PRINCIPLES OF UNIT OPERATIONS IN FOOD
PROCESSING TECHNOLOGY**

DATE: 25TH APRIL 2024

TIME: 3:00-5:00 PM

INSTRUCTIONS TO CANDIDATES

This paper is divided into two sections, **A and B**. Answer ALL Questions in SECTION A and any Two in SECTION B

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 2 Printed Pages. Please Turn Over

SECTION A: ANSWER ALL QUESTIONS (40 MARKS)

Q1. Explain why the law of conservation of energy is more complex concept than the laws of mass conservation. (4mks)

Q2. Using specific examples explain the concept of unit operations in food processing (4mks)

Q3. Define the following terms

i. Enthalpy

ii. Entropy (4mks)

Q4. State the classes of processes based on the following

i. Process variation with time

ii. Process operation design (4mks)

Q5. State the continuity equation (4mks)

Q6. i. State the modes of heat transfer during heat treatment process of foods (6mks)

ii. State only two thermal properties of foods (4mks)

Q7. 100kg of 2% salt solution is concentrated to give 20% salt product, calculate the amount of salt produced and amount of water evaporated (10mks)

SECTION B (30 MARKS)

Q8. 500kg of milk with 3.5% butterfat is to be re-constituted from skim milk with 0% butterfat and cream 40% butterfat. How much cream and skim milk will be required? (15mks)

Q9. Q2 Discuss the relationship between entropy and the 3 laws of thermodynamics (15mks)

Q10. Q3. The volumetric flow rate of beer flowing in a pipe is 1.8 L/s. The inside diameter of the pipe is 3cm. The density of the beer is 1100kg/m³. Calculate the average velocity of beer and its mass flow rate in Kg/s. If another pipe with a diameter of 1.5cm is used, what will be the velocity for the same volumetric flow rate? (15mks)

Q11. Describe the following pumps used in the pumping systems of the fluid food processing

I. Centrifugal

II. Positive displacement (15mks)