



FACULTY	AGRICULTURE, ENGINEERING AND NATURAL SCIENCES		
SCHOOL	AGRICULTURE AND FISHERIES SCIENCES		
DEPARTMENT	FOOD SCIENCE AND SYSTEMS		
SUBJECT	APPLIED FOOD ENGINEERING		
SUBJECT CODE	AFST 3891		
DATE	JUNE 2024		
DURATION	2 HOURS	MARKS	100

FIRST OPPORTUNITY EXAMINATION

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This question paper consists of **one (1)** page excluding this front page.

Instructions

- Answer all **five (5)** questions
- Calculators are allowed.

QUESTION 1

- a) It is found that the rate of corrosion of equipment in the plant you work in is higher than that normally associated with the materials of construction used. Outline five (5) possible reasons for this. [10]
- b) Briefly describe five (5) steps you would propose to the Purchasing Department to select and purchase food processing equipment. [10]

QUESTION 2

- a) Briefly discuss the reasons for the wide use of plate heat exchangers in the food industry. [6]
- b) The pressure drop is normally calculated in the design of a basic tubular heat exchanger. Discuss the importance of calculating the pressure drop and describe how its value may be changed. [5]
- c) Discuss steam injection as a method for heating foods. [9]

QUESTION 3

- a) You are requested to select a commercial blancher to be used in the production of frozen French fries. Describe the blancher type you would recommend and support your choice. [10]
- b) In pasteurising a fruit juice, the D value at a reference temperature of 85°C was 15 minutes while the z value was 8.7°C. Calculate the holding time (in seconds) that would give an equivalent lethality if a new pasteuriser that heats the juice to 102°C is used. [5]
- c) Briefly discuss thermal process validation in a canning operation. [5]

QUESTION 4

- a) Describe the following cold storage problems and how each may be avoided:
 - i) condensation [3]
 - ii) freezer burn [3]
 - iii) recrystallisation [3]
- b) Blast freezers are commonly used in the Namibian fish processing industry. Outline what makes them suitable for use. [5]
- c) Describe the operating principle of a Liquid Ring Vacuum Pump. [6]

QUESTION 5

- a) Outline any five (5) factors of importance for the efficient operation of a cooling tower. [5]
- b) Motivate for a company adopting an automatic process control system. [10]
- c) With the aid of a hierarchy diagram, illustrate the different capabilities of process control systems. [5]

END OF EXAMINATION