

2ND SEM. 2010/11



UNIVERSITY

OF SWAZILAND

FINAL EXAMINATION PAPER

**PROGRAMME : BACHELOR OF SCIENCE IN FOOD
SCIENCE, NUTRITION & TECHNOLOGY
YEAR II**

COURSE CODE : FSNT 205

TITLE OF PAPER : PRINCIPLES OF FOOD ENGINEERING

TIME ALLOWED : TWO (2) HOURS

**INSTRUCTIONS : ANSWER QUESTION ONE (1) AND ANY
OTHER TWO (2) QUESTIONS**

**DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN
GRANTED BY THE CHIEF INVIGILATOR**

QUESTION ONE [COMPULSORY]

- a. Discuss the importance of thermal death time in the destruction of microorganisms in food.
(12 Marks)
- b. Discuss the factors that are likely to affect the rate of dehydration of potato cubes using hot air.
(12 Marks)
- c. What is the importance of stirring when heating the flour/water mixture during the making of thin porridge such as *incwancwa*?
(8 Marks)
- d. What are the differences and similarities between blanching and pasteurization?
(8 Marks)

[TOTAL MARKS = 40]

QUESTION TWO

- a. A processor wanted to thaw frozen juice in a stainless steel container, at a temperature of 273 K, by immersing it in water at 373 K. If the thermal conductivity of stainless steel is $21 \text{ Wm}^{-1}\text{K}^{-1}$, the total surface area is 0.04 m^2 and the wall thickness is 10^{-4} m , calculate the initial rate of heat transfer in joules per second (Js^{-1}) from the hot water into the frozen juice. (Show your working clearly).
(20 Marks)
- b. Discuss practical ways of maintaining a high rate of heat transfer when heating liquid food in a steam jacketed vat.
(10 Marks)

[TOTAL MARKS = 30]

QUESTION THREE

- a. Discuss the effect of milk homogenization on the rate of separation of milk fat globules.
(10 Marks)
- b. Explain two other ways in which emulsions can be stabilized
(8 Marks)

- c. Counter-current flow is known to give better heat and mass transfer rates than co-current flow arrangement during dehydration of foods. However, in most milk drying plants, co-current flow is used. Explain the reasons for this arrangement.

(12 Marks)

[TOTAL MARKS = 30]

QUESTION FOUR

- a. Give a flow diagram of a compression refrigeration cycle and discuss the functioning principles of any three stages in the cycle.

(15 Marks)

- b. Discuss practical ways of minimising heat loss in a frozen storage room.

(10 Marks)

- c. Why is saturated steam a better heating medium than water at the same temperature?

(5 Marks)

[TOTAL MARKS = 30]