



**UNIVERSITY OF
SWAZILAND**

FACULTY OF HEALTH SCIENCES

B.Sc. ENVIRONMENTAL HEALTH SCIENCE

SEMESTER I EXAMINATIONS

TITLE OF PAPER: FOOD PROCESSING

COURSE CODE: EHM323

DURATION: 2 HOURS

DATE: DECEMBER 2014

INSTRUCTIONS:

1. READ THE QUESTIONS CAREFULLY.
2. ANSWER ANY 4 QUESTIONS.
3. EACH QUESTION CARRIES 25 MARKS. WHERE A QUESTION IS SUBDIVIDED INTO PARTS, THE MARK FOR EACH PART IS SHOWN IN BRACKETS.
4. NO PAPER SHOULD BE BROUGHT INTO THE EXAMINATION ROOM.
5. BEGIN EACH QUESTION ON A NEW PAGE OF THE ANSWER BOOK.

SPECIAL REQUIREMENTS: CALCULATOR

DO NOT OPEN THE QUESTION PAPER UNTIL INTRUSCTED TO DO SO BY THE INVIGILATOR.

QUESTION 1

(a) Write short notes on the following:

- i. Streamline flow and turbulent flow. [5]
- ii. Newtonian fluids. [5]
- iii. Emulsion. [5]
- iv. Fouling. [5]

(b) Calculate the Reynolds number for each of water and glycerol flowing along a pipe of diameter 0.2m at the same average velocity of 2.0m s^{-1} . [$\mu_w = 10^{-3}\text{ kg m}^{-1}\text{ s}^{-1}$; $\mu_g = 1.47\text{ kg m}^{-1}\text{ s}^{-1}$] and state whether it is streamline or turbulent flow. [5]

[25]

QUESTION 2

(a) Use a diagram to illustrate the concept of thermal death time (TDT) and explain the use of the concept. [5]

(b) Compare and contrast direct heat treatment with indirect heat treatment. [10]

(c) Discuss the factors that determine the heat resistance of microorganisms in food. [10]

[25]

QUESTION 3

(a) It is desired to prepare a ready-to-drink orange juice containing 10% total solids. The initial pressed juice contains 50% of total solids. It will be mixed with a sugar solution containing 10% sugar. Use the Pearson Square to calculate the proportions of each of the orange juice and the sugar solution that must be mixed. [6]

(b) If 50L of the drink have to be made, calculate the volumes of each of the components that will be needed. [4]

(c) Calculate the component mass balance for mixing ingredients to make 25kg of beef sausages having a fat content of 30%, using fresh beef meat and beef fat. Typically beef meat contains 18% protein, 12% fat and 68% water and beef fat contains 78% fat, 12% water and 5% protein. [10]

(d) Use an equation to explain Bernoulli's principle of fluid flow. [5]

[25]

QUESTION 4

- (a) List 5 types of equipment used in drying food. [5]
- (b) Using a diagram to illustrate, describe the movement of moisture during drying of food using heated air. [10]
- (c) What is meant by:
 - i. Constant rate period. [5]
 - ii. Falling rate period. [5]

[25]

QUESTION 5

- (a) State Kick's law. [2]
- (b) List the factors that influence extent of size reduction. [4]
- (c) Distinguish between sorting and grading. [4]
- (d) Briefly explain the purpose and process of conditioning in the milling of wheat. [15]

[25]

END OF EXAMINATION