# UNIVERSITY OF SWAZILAND

## FACULTY OF HEALTH SCIENCES

## B.Sc. ENVIRONMENTAL HEALTH AND FOOD SCIENCE

### SEMESTER I

### RE-SIT EXAM

### JANUARY 2019

**TITLE OF PAPER:**    FOOD PROCESSING

**COURSE CODE:**    EHS427

**DURATION:**    2 HOURS

**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. WRITE NEATLY AND CLEARLY
6. BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.

**SPECIAL REQUIREMENTS:** NONE

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR.

## QUESTION 1

a. State the assumptions behind steady state heat transfer. Give the equation involved. [4 marks]
b. Explain the difference between direct and indirect heating methods. [8 marks]
c. Outline the factors influencing heat transfer during canning of fruits or vegetables. [13 mark]

**[Total: 25 marks]**

## QUESTION 2

a. Discuss the preservative effect of heat processing under the following headings:
   i. Factors determining heat resistance of microorganisms. [12 marks]
   ii. Effect of heat on microorganisms and enzymes. [13 marks]

**[Total: 25 marks]**

## QUESTION 3

a. Explain why freezing is a more effective preservation method than chilling. [5 marks]

b. Describe the processes involved during:

   i. Cooled air freezing. [5]

   ii. Cryogenic freezing. [5]

c. Discuss the advantages and concerns of irradiating food. [10]

**[Total: 25 marks]**

## QUESTION 4

Discuss the concept of commercial sterility, with special consideration of the following:
   i. Total heating effect $(F_0)$. [10]
   ii. The Botulinum cook. [5]
   iii. The z value. [5]
   iv. Acid and low acid foods. [5]

**[Total: 25 marks]**

## QUESTION 5

a. Distinguish between the following sets of terms:

   i. Streamline flow and turbulent flow of fluids. [5]

    ii.   Newtonian and non-Newtonian liquids. [5]

   iii.   Emulsion and foam. [5]

   iv.   Sorting and grading. [5]

b.  Calculate the Reynolds number for each of water and glycerol flowing along a pipe of diameter 0.1m at the same average velocity of 1.0m s$^{-1}$. [$\mu_w = 10^{-3}$ kg m$^{-1}$ s$^{-1}$; $\mu g = 1.47$ kg m$^{-1}$ s$^{-1}$, density of glycerol = 1260.0 kg m$^{-3}$]. Comment on the results. [5]

**[Total: 25 marks]**

## END OF QUESTION PAPER