



UNIVERSITY OF SWAZILAND  
Faculty of Health Sciences  
Department of Environmental Health Science

DEGREE IN ENVIRONMENTAL HEALTH AND FOOD  
SCIENCE

**SUPPLEMENTARY EXAMINATION PAPER 2018**

TITLE OF PAPER : FERMENTED FOODS  
COURSE CODE : EHM 424  
DURATION : 2 HOURS  
MARKS : 100

INSTRUCTIONS : READ THE QUESTIONS & INSTRUCTIONS CAREFULLY  
: ANSWER ANY FOUR QUESTIONS.  
: EACH QUESTION CARRIES 25 MARKS.  
: WRITE NEATLY & CLEARLY  
:  
: BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.

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

### QUESTION ONE

The common starter cultures used in fermented foods are from the Lactic Acid Bacteria (LAB) group. Some of the processes involved in substrate metabolism by LAB have to do with Oxidation – Reduction reactions.

- (a) Briefly elaborate what is Oxidation – Reduction reaction. [5 Marks]
- (b) Illustrate the process of biological Oxidation – Reduction reaction with aid of diagrams. [10 Marks]
- (c) Compare and contrast Homofermentation and Heterofermentation processes of substrate metabolism by LAB. [10 Marks]

**Total [25 marks]**

### QUESTION TWO

- (a) Give an account of some of the main beneficial properties of fermented foods [12 Marks]
- (b) Describe the seven genera of lactic acid bacteria that are directly employed in fermentations with respect to specific genus, cell morphology, and fermentation route. [7 Marks]
- (c) Differentiate the following;
  - (i) *Oenococcus oeni* from *Leuconostoc* spp [3 Marks]
  - (ii) *Leuconostoc* from streptococci, Lactococci and *Pediococci* [3 Marks]

**Total [25 marks]**

### QUESTION THREE

- (a) Outline the differences between undefined and defined starter cultures. [5 Marks]
- (b) Using your knowledge of manufacture of starter cultures, briefly explain why the following materials are added in the production fermenter?
  - (i) Water soluble vitamins [1 Mark]
  - (ii) Surfactant Tween 80 [1 Mark]
  - (iii)  $\text{NH}_3$ ,  $\text{NH}_4\text{OH}$  or  $\text{Na}_2\text{CO}_3$  [1 Mark]
  - (iv) KOH [1 Mark]
  - (v) Catalase [1 Mark]
- (c) What is the role of meat composition with regard to meat fermentation. [5 Marks]
- (d) During the manufacture of fermented sausages, sugar is added at varying rates as an ingredient, what are the effects of adding sugar at high rates? [5 Marks]
- (e) Despite *Pediococcus* and *Lactobacillus* being used as starter cultures in the manufacture of fermented sausages for the same basic role (ferment sugars and produce organic acids) they vary with respect to several vital physiological and biochemical properties. In tabular form, outline vital physiological and biochemical properties of any five (5) genera and species of *Pediococcus* and *Lactobacillus*. [5 Marks]

**Total [25 Marks]**

**QUESTION FOUR**

- (a) Briefly explain why *Microoccus* sp are rarely used in fermented foods. [5 Marks]
- (b) Differentiate between catabolism and anabolism microbial metabolism. [5 Marks]
- (c) Enzymes play major roles in substrate metabolism. What are the major structural components of microbial enzymes? [8 Marks]
- (d) Briefly outline the process of manufacture of vinegar [7 Marks]

**Total [25 Marks]**

**QUESTION FIVE**

Write short notes on the following,

- (i) Harvesting and preparation of grapes for wine making [8 Marks]
- (ii) Factors affecting yeast metabolism in wine fermentation [8 Marks]
- (iii) Aging in wine. [9 Marks]

**Total [25 marks]**