



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION

DEPARTMENT OF SCIENCE, MATHEMATICS AND TECHNOLOGY
EDUCATION

MSE - CHE

PST6336 ADVANCED BIOCHEMISTRY

Main Examination Paper

November 2024

This examination paper consists of 2 printed pages

Time Allowed:	3 hours
Total Marks:	100
Special Requirements:	NONE
Examiner's Name:	I. MATIBELA
External Examiner:	DR. S. J. MPOFU

INSTRUCTIONS

1. Answer **any four** questions
2. Each question carries 25 marks.
3. Begin each question on a new page.
4. Use of chemical structures and equations is encouraged.

Answer any four questions.

Question 1 [25 marks]

Trivalerin (C5:0) is a triacylglyceride.

- (a) Write a sequence of processes involved in the catabolism of trivalerin. [5]
- (b) Give a detailed account of β -oxidation of valerate. [15]
- (c) Calculate the total energy in terms of ATPs produced from complete breakdown of one **trivalerin** molecule. [5]

Question 2 [25 marks]

- (a) Discuss the production of ATP in oxidative phosphorylation. [8]
- (b) Describe the preparatory phase of glycolysis. [10]
- (c) Account for the **two** carbons in the complete oxidation of acetyl coenzyme A in the citric acid cycle. [7]

Question 3 [25 marks]

- (a) Assess the regulation of gluconeogenesis. [10]
- (b) Describe the synthesis of aldosterone from progesterone. [8]
- (c) Give an overview of the stages in drug discovery. [7]

Question 4 [25 marks]

- (a) With the aid of detailed illustrations, explain the role of insulin in the metabolism of glycogen. [15]
- (b) Describe the mechanism of action of carboxypeptidase A. [10]

Question 5 [25 marks]

- (a) Outline the conversion of isopentylpyrophosphate to squalene. [10]
- (b) Explain gene expression using Polymerase Chain Reaction (PCR) & Covid-19 testing. [8]
- (c) Relate the growth of cancer cells to the cell cycle. [7]

END OF EXAMINATION PAPER