



MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

FIRST/SECOND YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (POPULATION HEALTH)

SBC 104/SZL 205: STRUCTURE OF BIOMOLECULES

PRINCIPLES OF BIOCHEMISTRY

DATE: 26/5/2022

TIME: 11.00-1.00 PM

INSTRUCTIONS

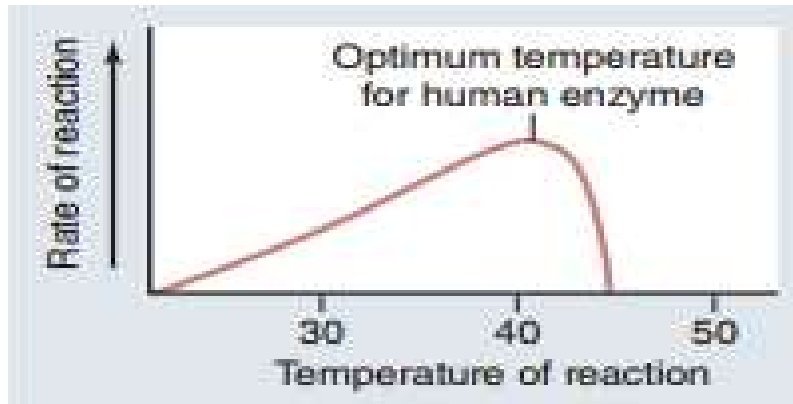
1. Answer Question 1 (compulsory) and **any two** questions in Section B.
2. Use clean well labelled diagrams wherever appropriate.

SECTION A

QUESTION ONE (30 MARKS)

- a) Illustrate the difference between saturated and unsaturated fatty acids. (3 marks)
- b) Describe the basic structure of an amino acid and the formation of a peptide bond. (3 marks)
- c) Explain “enzyme denaturation”. (3 marks)
- d) Predict the consequence of a loss of function of each of the following enzymes during DNA replication. (3 marks)
 - i. DNA gyrase
 - ii. DNA polymerase I
 - iii. Ligase
- e) Differentiate between a nucleotide and a nucleoside. (3 marks)
- f) Relate the structure and properties of DNA to its functions. (3 marks)
- g) Illustrate one exception of the central Dogma theory. (3 marks)
- h) Illustrate substrate level phosphorylation in glycolysis. (3 marks)

- i) Predict and explain the rate of the reaction when the levels of cellular ATP are low and when ATP levels are very high in an enzymatic reaction. (3 marks)
- j) Examine the graph showing the rate of reaction versus temperature for an enzyme–catalyzed reaction in a human



- i. Describe what is happening to the enzyme at around 40°C. (1 mark)
- ii. Explain why the line touches the x-axis at approximately 20°C and 45°C. (2 marks)

SECTION B

QUESTION TWO (20 MARKS)

- a) Account for the gross and net ATP production during glycolysis. (10 marks)
- b) Discuss the biomolecular lipids. (10 marks)

QUESTION THREE (20 MARKS)

- a) Using the Meselson–Stahl experiment, justify that DNA replication is semi-conservative. (5 marks)
- b) Discuss the process of gene expression. (15 marks)

QUESTION FOUR (20 MARKS)

Using relevant structural examples, explain the classification of carbohydrates.

QUESTION FIVE (20 MARKS)

- a) Describe catabolism of fatty acids and amino acids. (10 marks)
- b) Discuss the fate of pyruvate in the presence of Oxygen. (10 marks)