



TECHNICAL UNIVERSITY OF MOMBASA
SCHOOL OF APPLIED AND HEALTH SCIENCES

Department of Pure & Applied Sciences

UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN BIOCHEMISTRY

ABC 4202: ENZYMOLOGY PAPER 1

END-OF-SEMESTER EXAMINATION

SERIES: DECEMBER 2024

TIME: 2 HOURS

DATE: Pick Date Dec 2024

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass, and student ID

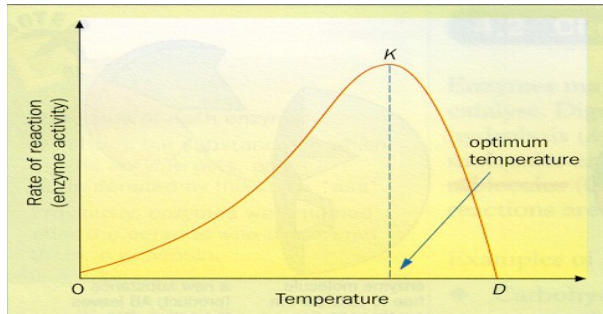
This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

- a) Describe four features of an active site of an enzyme. (4 marks)
- b) With an illustration of a graph, describe how enzymes speed up the chemical reaction. (4 marks)
- c) Using suitable examples, describe four roles of cofactors in enzyme catalysis. (4 marks)
- d) Outline the various models proposed to explain the substrate specificity of enzymes and the Enzyme-Substrate (E-S) complex. (4 marks)
- e) State the factors that affect the catalytic properties and activity of enzyme kinetics. (3 marks)
- f) Describe the Lineweaver-Burk plot and state its significance. (4 marks)
- g) Describe the mechanism of Bi-substrate kinetics with the following theories
 - (i) Sequential displacement (2 marks)
 - (ii) Ping-pong mechanism (2 marks)
- h) Explain the following terminologies in enzyme kinetics
 - (a) $V_{\max}$. (2 marks)
 - (b) K_m (2 marks)

- i) Describe enzyme regulation that influences the enzyme's substrate-binding affinity using the following mechanism
- (i) Proteolytic Activation of enzymes (2 marks)
 - (ii) Reversible Covalent Modifications (2 marks)
- j) Describe the enzyme activity to the following Rate- Temperature Graph. (5 marks)



Question TWO

Describe various applications of Enzymes in the following areas

- (i) Industrial applications (10 marks)
- (ii) medical applications (10 marks)

Question THREE

- (a) Derive the Michaelis Menten equation (15 marks)
- (b) Define the parameters (enzyme kinetics) used in the Michaelis Menten equation (5 marks)

Question FOUR

Describe various types of enzyme inhibition and elaborate on the practical uses of enzyme inhibitors in medicine and industries. (10 marks)

Question FIVE

Describe the features of the active site, functions, and mode of action of the following enzymes.

- (a) Ribonuclease (5 marks)
- (b) Lysozyme (5 marks)
- (c) Carboxypeptidase (5 marks)
- (d) Chymotrypsin (5 marks)