

Exam Roll No:

JAMIA HAMDARD

SCHOOL OF CHEMICAL AND LIFE SCIENCES
DEPARTMENT OF BIOCHEMISTRY

MSc Biochemistry, Semester I Examination, 2023

Paper Code: MBC 103

Paper Title: Enzymes

Time: 2½ h

Max Marks: 60

***Note:** This paper has 3 Sections, A, B, and C. Attempt all three sections. Section A: Answer all the questions; Section B: Answer any one; Section C: Answer all the questions, each question in this section has an internal choice*

Course/Program Learning Outcomes (CLO/PLO) and Blooms Taxonomy Levels (BTL):

CLO-1: Understand concepts

CLO-2: Systematically learn the processes

CLO-3: Gain knowledge of mechanism

CLO-4: Comprehend how things are integrated

CLO-5: Analyze and evaluate processes

SECTION A

Attempt All Questions

(1x10=10 Marks)

Q. No. 1	OBJECTIVE TYPE QUESTIONS (DO AS DIRECTED)	BTL	CLO	PLO
(a)	(i) Determine the K_{cat} if E_t is 8 nM, and $V_{max}=3.9\mu Ms^{-1}$.	1	2	3
	(ii) The Co-factor present in active site of E_t enzyme in Pyruvate Dehydrogenase Complex	3	2	3
	(iii) For a Non-Competitive inhibition, k_m increases while V_{max} remains constant (True/False)	4	5	2

(iv) At lower [S] concentration, the enzyme catalyzed reaction follows order reaction kinetics.	1	4	3
(v) Eadie-Hofstee equation to determine V_0 & K_m of enzyme catalysed reaction is.....	3	3	2
(vi) A Bisubstrate reaction, in which one or more products are released before all substrates have been added are known as..... reactions.	5	4	3
(vii) Chymotrypsin stabilizes the tetrahedral oxyanion transition state of the substrate in the active site. The amino acid important for oxyanion hole is/are.....	4	4	3
(viii) Lysozyme uses Covalent catalysis and General acid mechanism of catalysis to digest bond between NAG & NAM in bacterial cell wall (True/False)	4	4	3
(ix) Microcapsule type Entrapping involves enclosing enzyme within semipermeable membrane (True/False)	2	2	3
(x) The allosteric regulation of ATCase is brought about by interaction with activator.....	2	2	3

SECTION B

Attempt Any Two Questions

(2x12½ = 25 Marks)

Q. No. 2	LONG ANSWER QUESTIONS	BTL	CLO	PLO
(a)	Explain Pyruvate Dehydrogenase Complex as multifunctional enzyme.	3	2	3
(b)	Derive the Michaelis-Menten equation for competitive inhibition. Illustrate example of competitive inhibitor that are used as a therapeutic drug.	5	3	2
(c)	What are the different catalytic mechanisms of enzymes? Describe the catalytic mechanism of chymotrypsin.	2	2	3
(d)	Describe different modes of enzyme immobilization and mention its advantages and disadvantages.	1	1	2

SECTION C

Attempt All Questions

(5x5 = 25 Marks)

Q. No. 3	SHORT ANSWER QUESTIONS	BTL	CLO	PLO
(a)	Define Enzyme Activity and calculate the specific activity of Enzyme B in the crude extract as U/mg, where enzyme activity is 9.9U/cm ³ and protein concentration is 10.8mg/cm ³ . OR What are enzymes? Describe properties, classification, and nomenclature of enzymes.	4	5	3
(b)	Derive Michaelis-Menten equation and draw a graph that shows relation between V_0 & K_m of enzyme catalyzed reaction. OR Derive and graphically explain different plots used to determine V_0 & K_m of enzyme catalyzed reaction.	3	4	3
(c)	Carbonic anhydrase of erythrocytes (M_r 30,000) has one of the highest turnover numbers known. It catalyzes the reversible hydration of CO ₂ . If 20 μ g of pure carbonic anhydrase catalyzes the hydration of CO ₂ in 2 min at 37°C at V_{max} , what is the k_{cat} of carbonic anhydrase (in units of min ⁻¹)? OR Explain Enzyme catalyzed reactions involving two substrates using Cleland's shorthand notation.	4	3	2
(d)	Explain the mechanism of Covalent Catalysis with reference to Glucosyl-Enzyme Intermediate. OR Diagrammatically explain the mechanism of action of Lysozyme.	2	2	3
(e)	Derive the equation that is used for determining the Degree of Cooperativity of the ligand binding to the enzyme. OR Illustrate Class-I and Class-II non-enzymatic reactions.	5	1	3

END OF THE QUESTION PAPER