

Roll No: _____

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B.Sc. Biochemistry, Semester II Examination, October 2023

Paper Title: Proteins and Enzymes

Paper Code: BBC DSC 201

Time: 2.5 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 two; Section C: Answer all the questions, each question in this section has an internal choice.

Abbreviations Used:

CLO- Course Learning Outcome, PLO- Program Learning Outcome, BTL- Bloom Taxonomy Level: BT level 1- Remember; BT level 2-Understand; BT level 3-Apply; BT level 4-Analyse; BT level 5-Evaluate, BT level 6-Create.

SECTION A

[1x10=10 Marks]

Q. No. 1	MCQs or fill in the blank type questions. Attempt all questions.	BTL	CLO	PLO
a	Tertiary structure is formed by long-range interactions between amino acids. (True/False).	3	1	2
b	L-isomer amino acids are slightly more soluble than D- isomer. (True/False).	1	1	3
c	The ionization state of an amino acid does not vary with pH. (True/False).	1	2	3
d	The peptide bonds are purely double bonded in nature. (True/False).	3	1	3
e	Catalytic activity of allosteric enzymes can be regulated by binding of..... and.....	1	2	3
f	The allosteric regulation of ATCase is brought about by interactions with activator.....	3	2	3
g	Irreversible inhibitors don't follow Michaelis Menten Kinetics (True/False)	4	5	2
h	Microcapsule type Entrapping involves enclosing enzyme within semipermeable membrane. (True/False)	1	4	3
i	The the upper limit on k_{cat}/K_M for an enzyme is between 10^8 and 10^9 $s^{-1} M^{-1}$ (True/False)	1	3	3
j	The reaction rates of an enzyme catalyzed reactions are independent of the activation energy ($\Delta G^\ddagger$). (True/False)	2	3	3

SECTION B

[2x12.5=25 Marks]

Q. No 2	Long type Questions (Attempt ANY TWO out of four)	BTL	CLO	PLO
A	Discuss the steps involved in protein purification from a source. How can purity of a protein sample can be analyzed?	1	1	3
B	Discuss two models that explains the Haemoglobin cooperativity. Also discuss the role of 2,3-Bisphosphoglycerate in determining the oxygen affinity of hemoglobin.	2	2	2
C	Derive Michaelis-Menten equation and mention the significance of K_m and V_{max} .	3	3	3
D	Define immobilized enzyme and illustrate the different methods for the immobilization of enzymes.	3	4	3

SECTION C

[5x5=25 MARKS]

Q. No	Short-type Questions (Attempt all questions, each question has an internal choice)	BTL	CLO	PLO
3	Discuss the outline of peptide sequencing by Edman degradation. OR Write a short note on the synthesis of peptides using Merrifield method.	1	1	3
4	Discuss the principle and applications of affinity chromatography. OR Discuss the principle and applications of Ion-Exchange Chromatography.	2	2	3
5	Discuss the salient features of alpha helical secondary structure of protein. OR Write a short note on Anfinsen experiment and protein folding.	3	3	2
6	Explain the three distinct mechanisms used inside the cell to regulate enzyme activity. OR What are the different catalytic mechanisms of enzymes? Describe a detailed mechanism for chymotrypsin mechanism of action.	4	4	3
7	Discuss briefly the different types of enzyme inhibition and illustrate example of competitive inhibitor that are used as a therapeutic drug. OR Discuss different general mechanisms of catalysis followed by Enzymes.	3	3	3

END OF THE QUESTION PAPER