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1371

Your Roll No.

B.Sc. (Hons.)/II

A

BIOCHEMISTRY – Paper VII

(Proteins, Enzymes and Co-enzymes)

(Admissions of 2000 and onwards)

Time : 3 Hours

Maximum Marks : 60

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

*Attempt Five questions in all,
including Q. No. 1 which is compulsory.*

- I. (a) Study the following statements and justify whether True or False :
- (i) Disulfide bridges are formed in a protein before it folds.
 - (ii) Isozyme play a role in clinical diagnosis.
 - (iii) V_0 vs $[S]$ curves of allosteric enzymes shift to the left under the effect of negative cooperativity.
 - (iv) Lysozyme follows a ping-pong mechanism.
 - (v) Doubling enzyme concentration doubles velocity.
 - (vi) A purified enzyme has maximum specific activity.

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- (vii) Vitamins are modified structurally before being used as coenzymes.
- (viii) Transition state analogs undergo reaction to form analogous products.
- (ix) In solid state peptide synthesis growth of the peptide is N to C terminus.
- (x) CNBr cleaves past Met residues and hence the released N-terminal peptide has Met on its C terminus. (1×10)
- (b) Indicate one major contribution of the following scientists to protein/enzyme biochemistry.
- (i) Francis Jacob
 - (ii) D.C. Phillips
 - (iii) John Kendrew (1×3)
- (c) Define
- (i) International units for enzyme activity
 - (ii) Turnover number
 - (iii) Allosteric modulator (1×3)
2. (a) Explain why ψ vs ϕ plots for glycine have points all over the four quadrants of the Ramachandran plot unlike Alanine? (4)
- (b) Is the primary structure of a protein all that is required for its 3-D folding? Explain. (3)

- (c) Why is proline preferred in the collagen triple helix unlike in a regular α -helix ? (4)
3. (a) Why do $\text{NAD}^+/\text{NADP}^+$ dependant dehydrogenases show R and S stereospecificity ? (4)
- (b) Why is pyridoxal phosphate considered a versatile coenzyme ? Indicate its mechanism in any one reaction. (7)
4. (a) Differentiate between enzymes used as reagents in clinical diagnosis and enzymes measured for activity with relevant examples. (4)
- (b) Explain why enzymes can lose activity during immobilisation ? (3)
- (c) With an example suggest why affinity chromatography is the best method to purify a labile enzyme ? (4)
5. (a) Draw the $\frac{1}{V_0}$ vs $\frac{1}{[S]}$ plots for different types of bisubstrate reactions. (4)
- (b) Molecular Chaperones assist protein folding, explain. (3)
- (c) Why does the K_m alter in the presence of a competitive inhibitor ? (4)

6. (a) Explain the importance of an allosteric enzyme citing a suitable example. (6)
- (b) 2, 3 BPG levels increase as an adaptation to high altitude acclimatisation. What is the probable mechanism? (5)
7. (a) Lysozyme shows a bell shaped curve for a plot of activity vs pH. Explain using the known mechanism of lysozyme catalysis. (5)
- (b) On binding its substrates, hexokinase undergoes a conformational change. How does this contribute to its catalysis? (3)
- (c) Low amounts of an inhibitor can activate an allosteric enzyme. Justify with an example. (3)
8. (a) In determining the primary structure of a polypeptide how would you devise strategies for overcoming the following :
- (i) The peptide has no basic residues and hence cannot be cleaved by trypsin.
- (ii) The peptide has several disulfide bonds. (4)
- (b) Indicate with structures and equations the Edman sequencing reactions. Why is it better to sequence smaller peptides of about 50 residues rather than larger ones? (5)
- (c) How does the presence of rennin in the stomach of infants facilitate digestion of milk proteins? (2)