[This question paper contains 5 printed pages]

Your Roll No

5802 **J**

B.Sc. (Hons.)/II

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*

1 (a) State whether the following statements are *true* or *false* Give reasons for your answer in 2 or 3 lines only 12

(i) Collagen's double helical structure is responsible for its characteristic tensile strength

(ii) Urea & guanidium ion act to denature proteins by competing for their internal hydrogen bonds

(iii) Increased BPG levels are partially responsible for high altitude adaptations

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(iv) The Km of a regulatory enzyme varies with enzyme concentration

(v) Reactions catalysed by dehydrogenases are usually bisubstrate in nature

(vi) Mg^{2+} is essential for carboxypeptidase activity

(vii) Two proteins having identical amino acid composition do not necessarily have the same isolectric point

(viii) The optimum temperature of an enzyme is an indicator of its stability rather than catalysis

(ix) An enzyme changes the overall equilibrium constant of a reaction

(x) For many enzymes, V_{max} is independent of pH

(xi) Enzymes can be protected against thermal denaturation during purification procedure by addition of substrate

(xii) Serine is the residue most often replaced without loss of protein function

(b) Mention the scientific contribution of the following Scientists 4

(i) Levinthol

(ii) John Kendrew

(iii) Linus Pauling

(iv) William Astbury

2 Describe

(i) The role of PDI and PPI's in protein folding 3

(ii) The Hill coefficient is a measure of co-operativity 3

(iii) In the symmetry model of allosterism, an inhibitor must undergo a positive homotropic effect 3

(iv) The severly anaemic condition of homozygotes for Hbs results in an elevated BPG content in their erythrocytes 2

3 Why do you use the following reagents/enzymes in protein chemistry ? 11

(i) CNBr

(ii) Urea

(iii) Performic acid

(iv) β-mercaptoethanol

(v) Ethyleneimine

(vi) Chymotrypsin

(vii) Ninhydrin

(viii) Hydrazine

(ix) Clabsylchloride

(x) Phenylisothiocyanate

(xi) Carboxypeptidase

4 (a) Enlist the various steps required to synthesis a polypeptide by solid phase method 7

(b) Active site of enzyme have some common features Explain 4

5 (i) (a) At what substrate concentration would an enzyme with a Kcat of 30 0 s^{-1} and Km of 0 0050 M operate at $\frac{1}{4}$ of its maximum rate ?

(b) Determine the fraction of V_{max} that would be obtained at the following substrate concentration

(S) $\frac{1}{2}$ Km, 4 Km and 8 Km 4

(ii) What do you understand by Kinetic Perfection and why the upper limit is between 10^5 and 10^9 m^{-1} s^{-1} only? 3

(iii) If 10 0 bg of pure carbonic anhydrase catalyses the hydrations of 0 30 g of CO_2 in 1 min at 37°C at V_{max}, What is the Kcat of enzyme ? 4

6 (i) Differentiate the mode of competitive and uncompetitive inhibition 5

(ii) Describe the various methods of regulation adopted by the enzymes 6

7 Explain the following

(i) Allosteric enzymes undergo conformational changes in response to modular binding 2

(ii) Enzyme accelerates reaction by stabilising transition states 3

(iii) Hb is allosteric protein whereas myoglobin is not 3

(iv) Quality of a protein can be assessed by Ramachandran plot 3

8 Write short notes on the following

(i) Isozyme/Suicide inactivator 3

(ii) Zymogens/Immobilised enzyme 4

(iii) Haemoglobin/Myoglobin 4