This question paper contains 3 printed pages. *Your Roll No. .....*

Sl. No. of Ques. Paper	**: 914 G**
Unique Paper Code	**: 249301**
Name of Paper	**: Proteins and Enzymes : BCHT-304**
Name of Course	**: B.Sc. (Hons.) Biochemistry**
Semester	**: III**
Duration :	**: 3 hours**
Maximum Marks	**: 75**

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

Attempt five questions in all. Q. No. 1 is compulsory.

1. (a) State whether True or False with justification:

   (i) Hydrophobic interactions drive protein folding.

   (ii) Amoxicillin and Clavulanic acid are combined in a widely used pharmaceutical formulation used to treat bacterial infections.

   (iii) Multimeric proteins always show cooperativity.

   (iv) Enzymes lower E_a by releasing binding energy.

   (v) During purification the use of protease inhibitors results in higher recovery.

   (vi) Allosteric enzymes show hyperbolic curves at higher substrate concentrations.

   (vii) In studying the kinetics of bisubstrate reactions both substrate concentrations must be simultaneously increased.

   (b) Indicate briefly the contributions of the following scientists:

   (i) J.B.S. Haldane

   (ii) Max Perutz

   (iii) Linus Pauling

   (iv) G.N. Ramachandran

   (v) David Phillips. 14,5

2. (a) Explain the following parameters used in enzyme kinetics with their significance:

   (i) K_M

   (ii) V_{max}

P. T. O.

(iii) K_{cat} / K_M

(b) How is the Lineweaver-Burke double reciprocal plot useful as a diagnostic plot? 9,5

3. (a) How do chaperones contribute to protein folding?

(b) Identify the coenzymes utilized by the following enzymes, give their structure, reaction catalysed and mechanism of action:

(i) Transaminase

(ii) Pyruvate Dehydrogenase. 4,10

4. (a) Explain various kinds of regulation in enzymes.

(b) While sequencing a peptide hormone, the lab sequencer could go upto 4 cycles. Using the following data arrive at a sequence for the hormone:

(i) Hydrazinolysis gave free V

(ii) Dansyl chloride treatment followed by acid hydrolysis gave dansyl-P.

(ii) Trypsin treatment followed by Edman degradation of the separated fragments:

(*1*) G-K

(*2*) F-I-V

(*3*) P-G-A-R

(*4*) S-R. 10,4

5. (a) What is the molecular defect in thallassemia and sickle cell anemia?

(b) Explain the molecular basis of the higher oxygen affinity of fetal haemoglobin.

(c) Enlist the various steps required to synthesize a polypeptide by solid phase method. 4,5,5

6. Explain the following (any *seven*):

(a) In the purification of enzymes a small amount of a competitive inhibitor is added for stability.

(b) For the correct renaturation of a multiple disulfide bonded protein a little amount of mercaptoethanol is included.

(c) In studying the kinetics of sucrose phosphorylase, sucrose and a litle amount of radioactive fructose is added.

(d) In the study of the role of coenzymes, for the enzyme succinate dehydrogenase no coenzyme is added in the assay.

(e) After ammonium sulphate fractionation, the fractions are subjected to dialysis before protein and enzyme assays are done.

(f) Substrate analogs are used as ligands in affinity purification.

(g) SDS-PAGE is useful for subunit molecular weight determination.

(h) Specific activity is a useful parameter in following a purification progress.

(i) Hemoglobin is an allosteric protein while myoglobin is not. 2×7=14

7. (a) Why is Aspartate transcarbamoylase considered an allosteric enzyme? Explain its importance and briefly indicate its mechanism of action.

(b) What are suicide inhibitors? Indicate their mechanism of action with an example.

(c) Describe the features of α-helix in a protein structure. 6,4,4

8. Write short notes:

(a) Multienzyme complexes

(b) Zymogens

(c) Structure of keratin

(d) Parallel and antiparallel β-sheets. 3,3,4,4