[This question paper contains 6 printed pages.]

Your Roll No.....

2019

Sr. No. of Question Paper : 2178 **IC**

Unique Paper Code : 32491201

Name of the Paper : PROTEINS

Name of the Course : **B.Sc. (Hons.) Biochemistry**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all. Question No. **1** which is compulsory.

1. (a) Provide reasons for the following :

(i) Dialysis is used for desalting of protein preparations.

(ii) The ψ and φ plot for glycine is scattered about the four quadrants of the Ramachandran plot.

(iii) Persons living at high altitudes have higher levels of BPG in blood.

(iv) Protein at its PI (Isoelectric point) does not move in electric field.

(v) In eukaryotes disulfide bonds in proteins are found primarily in secreted extracellular proteins.

(vi) Hydrophobic interactions are the major stabilizing interactions in soluble globular proteins.

(vii) Osmotic shock can cause cell disruption. (2×7)

(b) Cite one example of the following proteins/peptide :

(i) Glycoprotein

(ii) Phospho protein

(iii) Hormone

(iv) Fibrous protein

(v) Oligomeric protein (1×5)

2. (a) Provide definitions of the following :

(i) Protein denaturation

(ii) Motif

(iii) Quaternary structure

(iv) β turns

(v) Superfamilies of proteins (1×5)

(b) Write the following reactions :

(i) Reaction of N-terminal glycine with dansyl-chloride followed by hydrolysis with 6N HCl.

(ii) Edman degradation reaction for protein sequencing.

(iii) Reaction of a protein linked by disulfide bonds with performic acid. (3,4,2)

3. (a) Determine the sequence of small peptide based on the following observations :

(i) Complete hydrolysis revealed that the small peptide contain the following amino acids: Ala, Lys, 2Met, Gly, Leu, Asp.

(ii) Reaction with dansyl- chloride gave dansyl-Ala

(iii) CNBr treatment released :

a. Tertrapeptide having Ala, Met, Lys and Asp

b. Dipeptide having Gly and Met

c. Free amino acid was released as Leu

(iv) Trypsin treatment released :

a. Tripepetide containing Ala, Lys and Asp

a. Tetrapeptide containing Gly, Leu, 2Met (5)

(b) Write the salient structural features of the following proteins :

(i) α keratin

(ii) Immunoglobulin

(iii) Bacteriorhodopsin (3×3)

4. Mention the role of the following :

(i) SDS in SDS PAGE

(ii) Ampholytes in IEF

(iii) DEAE in DEAE-cellulose chromatography

(iv) Ammonium sulfate in salt fractionation

(4×3,2)

5. (a) Explain and compare the O_2 binding curves of Myoglobin and Hemoglobin.

(b) Explain the Bohr effect.

(c) Diagrammatically show how heme interacts with myoglobin molecule.

(d) Name the scientists who won the Nobel prize for structure determination of globin proteins in 1962.

(5,4,3,2)

6. Write the basis of the following :

(a) Huntington's disease

(b) Creutzfeldt-Jakob disease

(c) Scurvy

(d) Sickle cell anemia

(c) CO poisoning (3×4,2)

7. (a) Describe the mechanism of the following :

(i) ATP activated actin-myosin contractions.

(ii) Chaperonins assisted protein folding.

(iii) Solid phase peptide synthesis.

(b) Write the contribution of the following scientists :

(i) Christian Anfinsen

(ii) Pauling and Corey (4×3,2)

8. Write short notes on the following :

(a) Protein databases

(b) Sedimentation coefficient

(c) MALDI (TOF) MS

(d) α helix

(e) Lambert Beer's Law (3×4,2)

(2)

[This question paper contains 4 printed pages.]

Your Roll No.....

2019

Sr. No. of Question Paper : 2179 **IC**

Unique Paper Code : 32491202

Name of the Paper : Enzymes

Name of the Course : **B.Sc. (Hons.)/Bio-Chemistry**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **5** questions in all.
3. Q. **1** is compulsory.

1. (a) Explain the following :

   (i) Effect of temperature on the activity of an enzyme.

   (ii) Allosteric enzymes have oligomeric structures.

   (iii) Michaelis constant does not always reflect the affinity of the enzyme for the substrate.

P.T.O.

(iv) Transition state analogs are used in the active site characterization in enzymes.

(v) Allosteric enzymes show different kinetics as compared to non-allosteric enzymes

(vi) A purified enzyme has maximum specific activity (6×2=12)

(b) Identify the enzyme based on the following description :

(i) An enzyme that is competitively inhibited by malonate

(i) The first enzyme to be crystallized

(ii) An enzyme with the highest turnover number

(iii) A non-proteinaceous enzyme

(iv) A marker enzyme for lysosome

(v) An enzyme that is involved in digestion of food

(vi) An enzyme regulated by covalent modification (7)

2. (a) Differentiate between the following pairs **(any 4)** :

(i) Active Site and Regulatory Site

(ii) Metalloenzymes and Metal activated enzymes

(iii) Multienzyme complex and Multifunctional enzymes

(iv) Holoenzyme and Apoenzyme

(v) Reversible and Irreversible inhibition

(b) Define "specific activity". (12,2)

3. (a) Describe any 3 different ways of enzyme regulation citing an example in each case.

(b) What are isoenzymes? How do you distinguish isoenzymes experimentally? (9,5)

4. (a) Explain and describe graphically the following types of inhibition in enzymes:

(i) Competitive inhibition

(ii) Non-competitive inhibition

(iii) Uncompetitive inhibition

(b) Explain allosteric enzymes with examples. (9,5)

5. (a) What are the important catalytic residues of the enzyme lysozyme? Explain its mechanism of action.

(b) What are bisubstrate reactions? Explain single and double displacement reactions with suitable examples. (7,7)

P.T.O.

6. (a) Describe application of any 3 enzymes in diagnostics.

(b) Write applications of HRPO in enzyme immunoassay.

(c) Identify the coenzymes utilized by the following enzymes,

(i) Transaminase

(ii) Pyruvate carboxylase

(iii) Succinate dehydrogenase

(iv) Dihydrofolate reductase (6,4,4)

7. (a) What are immobilized enzymes? Describe the various methods of enzyme immobilization.

(b) Derive Michaelis Menten equation using the steady state assumption. What is the ratio of [S] to K_m when the velocity of an enzyme catalyzed reaction is 80% of V_{max}? (7,4,3)

8. Write short notes on the following :

(i) Zymogens

(ii) Immobilized enzymes

(iii) Induced fit hypothesis (4,4,6)

(3)

Sl. No. of Q.P. : 3547

I

2019

Unique Paper Code: 217251

Name of Paper: Chemistry-II (CHCT-402)

Name of Course: B.Sc (H) Biochemistry/Botany/Biomedical Science/Microbiology

Semester: II

Duration: 3 hrs

Maximum Marks: 75

Instructions for Candidates:

1. Write your roll number on top immediately on receipt of this question.
2. Attempt all questions.

1. **Answer the following:** **(5x3=15)**

a. What do you understand by concepts of stereoisomerism and chiral centre?

b. In gas phase the order of increasing basicity is:

Ammonia< Primary Amine (CH_3NH_2) < Secondary Amine $(CH_3)_2NH_2$< Tertiary Amine $(CH_3)_3N$

Account for this observation

Would this order remain the same or change in water?

c. Which is most stable and why?
Primary Carbocation
Secondary Carbocation
Tertiary Carbocation

d. Salicylic acid is 15 times more acidic than benzoic acid. Explain why.

e. Draw all possible conformations of cyclohexane and specify which is the most stable form giving reason.

2. **Explain any six the following with examples** **(6 x 3=18)**

a. Conformation
b. Meso form
c. Chiral Centre
d. Enantiomers
e. Diastereomers
f. Reducing sugar
g. Erythro and threo-prefixes

3. **Write short notes on the following:** **(5 x 4= 20)**

a. Conformational Isomerism
b. Resonance
c. Merrifield synthesis
d. Edmann Degradation

e. Racemic mixture

4. How would you accomplish the following conversions? **(3x2=6)**

a. D-Glucose to D-Fructose

b. D-Arabinose to D-Fructose

5. Give an account of the following with the help of mechanism: **(3)**

Osazone Formation of glucose

6. Can you explain why Fructose is a reducing sugar? **(3)**

7. Write the structure of Ninhydrin reagent explaining its use. **(3)**

8. Discuss the use of D.C.C. and t-BOC in peptide synthesis. **(3)**

9. How many stereoisomers are possible for tartaric acid? Draw structures in Fischer Projection formula. Apart from this, also explain how would these stereoisomers be related to each other? **(4)**