(14)

15/5/18

Sl No. 99 P: 5617

Unique Paper Code	:	217251 Roll no.....
Name of the Paper	:	CHEMISTRY –II (CHCT-402)
Name of the Course	:	B.Sc (H) Biochemistry/Botany/Biomedical Science /Microbiology
Semester	:	II
Duration	:	3hrs
Maximum Marks	:	75

H

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any FIVE questions.
3. All questions carry equal marks.

Q1. (a) Explain the following:

(i) Relative stability of primary, secondary and tertiary carbocations.

(ii) Homolytic and heterolytic bond fission.

(b) Although *p*-hydroxy benzoic acid is less acidic than benzoic acid, salicylic acid (*o*-hydroxy benzoic acid) is fifteen times more acidic than benzoic acid. Explain.

(c) Account for the following observations:

(i) In the gas phase the order of increasing basicity is

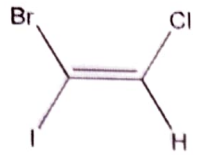
$NH_3 < CH_3NH_2 < (CH_3)_2NH < (CH_3)_3N$

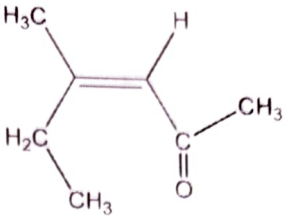
(ii) In water the order is

$NH_3 < CH_3NH_2 \approx (CH_3)_3N < (CH_3)_2NH$

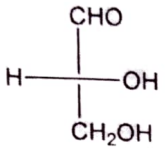
(6,4,5)

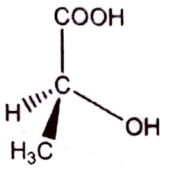
Q2. (a) Giving priority order assigns E-/Z- to the following:

i) 

ii) 

(b) Giving priority order assigns R-/S- to the following:

i) 

ii) 

(c) Explain the term 'meso form' with suitable example

(d) Draw all possible conformations of cyclohexane. Which amongst these is most stable? Give reasons for your answer.

(4, 4, 2, 5)

Q3. (a) How many stereoisomers are possible for tartaric acid? Draw structures in Fischer projection formula. Also explain how these stereoisomers are related to each other.

(b) Define configuration and differentiate between relative and absolute configuration.

(c) What do you understand by erythro and threo-prefixes? Explain by taking the example of 3-bromo-2-butanol.

(d) Define any two of the following with examples

(i) Enantiomers

(ii) Diasteriomers

(iii) Chiral centre

(4, 3.3, 5)

Q4. (a) Define primary, secondary, tertiary and quaternary structure of protein.

(b) Write a short note on Merrifield synthesis.

(c) What are D.C.C. and *t*-BOC? Discuss their use in peptide synthesis.

(d) What is ninhydrin Reagent? Write down the structure.

(4, 4, 4, 3)

Q5. (a) Explain osazone formation of glucose with mechanism.

(b)Explain why fructose is a reducing sugar

(c) Write the structural formula of α–anomer of glucose.

(d) Carry out the following conversions:

(i) D-Arabinose to D-Glucose

(ii) D-Glucose to D-Fructose

(5, 3, 2, 5)

Q6. Write a short note on any THREE of the following:

(a) Mutarotation
(b) Edmann degradation
(c) Hybridization
(d) Conformational isomerism

(5,5,5)

Practical (15)

This question paper contains **4** printed pages] 2018

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **6430**

Unique Paper Code : **32491201** **HC**

Name of the Paper : **Proteins**

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

Semester : **II**

Duration : **3 Hours** Maximum Marks : **75**

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

Answer *five* questions in all.

Question No. **1** is compulsory.

1 (A) Explain the following statements briefly :

(*i*) The SDS-PAGE technique is used to determine the number of subunits in a protein.

(*ii*) The Edman procedure is automated.

(*iii*) Membrane proteins are difficult to solubilize.

(*iv*) Proteins having one type of secondary structure are fibrous in nature.

(*v*) Haemoglobin cannot bind oxygen when its iron is in the ferric state.

(*vi*) Small peptides can be synthesized by solid phase peptide synthesis.

(*vii*) The solubility of a protein is least at its isoelectric pH.

(*viii*) Cis peptides conformations are disallowed in proteins.

(B) Write the contributions of the following Nobel Laureates to the field of protein chemistry :

(*i*) F. Sanger

(*ii*) L. Pauling

(*iii*) J. Kendrew. 16,3

2. (A) Myoglobin and Haemoglobin are similar in structure but serve entirely different roles in oxygen binding. Explain with oxygen binding graphs.

(B) Sickle celled anaemia is considered as a molecular disease, why ? How can the disease be diagnosed by peptide fingerprinting ? 7,7

3. (A) Using chemical structures explain the Edman degradation method of determining the sequence of a peptide. If a protein is made up of multisubunits how this protein would be sequenced ?

(B) Study the following data and derive the sequence of the given peptide :

(*i*) On N-terminal analysis no amino terminal was found.

(*ii*) C-terminal analysis similarly resulted in no C-terminal amino acid.

(*iii*) Amino acid analysis after HCl treatment resulted in the following amino acid composition: A2, K2, G2, P2, F2.

(*iv*) Treatment of the peptide with chymotrypsin resulted in two peptides with the same composition A, K, G, P, F.

(*v*) Treatment of the peptide with trypsin also yielded two peptides with similar composition.

(*vi*) Treatment of the peptides released after trypsin treatment resulted in A as the N-terminal amino acid.

8,6

4. (A) Differentiate between integral and peripheral membrane proteins. Give *two* unique features of integral membrane protein structures citing any *one* example you have learned.

(B) Describe the Ramachandran plot and explain why glycine in proteins has no restricted psi and phi dihedral angles.

(C) Briefly outline Anfinsen experiment concerning the denaturation and renaturation in Ribonuclease A. 5,5,4

5. (A) Write the principle of gel filtration chromatography and indicate its use in determining the molecular weight of a protein.

(B) What are molecular chaprerones ? Indicate their role in protein folding.

(C) Define the terms : Exclusion limit, fractionation range, water regain value, void volume. 6,4,4

6. (A) What are prion based diseases ? Indicate with an example the mechanism involved.

(B) Briefly indicate the principle of the use of mass spectrometry in the determination of peptide sequence. Is this method better than traditional sequencing methods ? 6,8

7. With examples differentiate between the following :

(*i*) Simple and conjugated proteins

(*ii*) Destructive and non-destructive protein analysis

(*iii*) N-terminal and C-terminal analysis

(*iv*) Salting in and salting out of proteins

(*v*) Amino acid sequence and amino acid composition of proteins

(*vi*) Basic and acidic proteins

(*vii*) Proteinaceous amino acids and modified amino acids in proteins. 7×2=14

8. Write short notes on :

(*i*) Solid phase peptide synthesis

(*ii*) Structure of keratins or collagen

(*iii*) Ammonium sulfate fractionation of proteins. 5,4,5

[This question paper contains 4 printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **6431**

Unique Paper Code : **32491202** **HC**

Name of the Paper : **Enzymes**

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

Semester : **II**

Duration : **3 Hours** Maximum Marks : **75**

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

Attempt **5** questions in all. Question No. **1** is compulsory.

1. (A) State whether true *or* false with justification :

(*i*) Allosteric enzymes obey Michealis-Menten kinetics at high substrate concentration.

(*ii*) Kcat/Km is a measure of catalytic efficiency.

(*iii*) PALA can act as an inhibitor of ATCase.

(*iv*) Enzymes lower activation energy by releasing binding energy.

(*v*) Only charged amino acids in the active site are known to participate directly in enzymatic reactions.

(*vi*) Suicide inhibition is reversible.

(*vii*) Catalysis by lysozyme requires a catalytic triad in the active site.

(B) Give examples of each :

(*i*) An enzyme bigger than the substrate

(*ii*) An enzyme regulated by reversible covalent modification

(*iii*) A lyase

(*iv*) A serine protease

(*v*) An enzyme with high turnover number. (14, 5)

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

(*i*) Apoenzyme and Coenzyme

(*ii*) Transition state and Activation energy

(*iii*) Acid base catalysis and Covalent catalysis

(*iv*) Uncompetitive and Non-competitive Inhibition

(*v*) Substrate analogs and Transition state analogs

(*vi*) Metalloenzymes and Metal activated enzymes

(B) Proteolytic enzymes are often synthesized as inactive zymogens. Explain why ? (12, 2)

3. (A) Give the applications of the following enzymes in diagnostics/medicine :

(*a*) Acid Phosphatase

(*b*) Creatine kinase

(*c*) Streptokinase.

(B) Give an example of enzyme that requires the following coenzyme. Also write the reaction catalysed by each enzyme :

(*i*) TPP

(*ii*) Pyridoxal phosphate

(*iii*) Tetrahydrofolate

(*iv*) Biotin. (6, 8)

4. (A) Define the following :

(*i*) Specific activity

(*ii*) S.I. unit of enzyme activity

(*iii*) Turnover Number

(*iv*) Ki

(*v*) Marker Enzymes

(B) Discuss the dependence of enzyme activity on the pH of the reaction. (10, 4)

5. (A) Derive Michaelis-Menten equation and show under what conditions $K_m = [S]$.

(B) Using the Line Weaver Burk plot, draw curves that would be obtained when :

(*i*) Competitive Inhibitor is added to an enzyme.

(*ii*) A non-competitive Inhibitor is added to an enzyme.

(*iii*) An uncompetitive Inhibitor is added to an enzyme.

Indicate how V_{max} and K_m change in each case. (5, 9)

6. (A) What are immobilized enzymes ? Describe *two* methods of immobilization.

(B) Explain different methods of regulation adopted by enzyme with suitable examples. (6, 8)

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

(B) What do you mean by isotope exchange and how can we use it to distinguish single and double displacement reactions ? (8, 6)

8. Write short notes on :

(A) Multienzyme complexes

(B) Isozymes

(C) Enzyme Classification

(D) Proximity Effect. (3,3,4,4)