Sr. No. of Question Paper : 1015   **D**

Unique Paper Code   : 2492011101

Name of the Paper   : Biomolecules (DSC-1)

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

Semester   : I

Duration : 2 Hours   Maximum Marks : 60

Instructions for Candidates

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

2.   There are **six** questions

3.   Attempt **any four** questions.

4.   **All questions** carry equal marks.

5.   **Question No.** 1 is compulsory.

1.   (a) Explain the following:

      (i) Sucrose is referred to as a non-reducing sugar.

      (ii) DNA absorbs more at 260nm with increase in temperature.

      (iii) Population that primarily consumes corn rich diet often suffers from pellagra.

      (iv) Oleic acid has a lower melting point than Elaidic acid.

      (v) Lactose exists in two anomeric forms but no anomeric forms of sucrose have been reported.   (2x5=10)

  (b) Write the reaction involved for the following:

      (i) RNA is treated with an alkali

      (ii) Phosphatidyl choline is treated with phospholipase A2   ($2.5 \times 2 = 5$)

2.   Differentiate between the following:

  (a) Thromboxanes and Leukotrienes

  (b) Essential and non-essential amino acids

(c) Homopolysaccharides and Heteropolysaccharides

(d) Chitin and Cellulose

(e) Glycoproteins and Proteoglycans

(f) tRNA and mRNA   (2, 2, 2.5, 2.5, 3, 3)

3.   (a) An investigator isolated two DNA samples (A and B) of same genome size but found that the melting point was different. The melting point of B was determined to be higher than A. Can you explain the reason behind it?

(b) Explain the different ionic forms of Histidine using a titration curve.

(c) Discuss any three types of membrane lipids.
                                              (4, 5, 6)

4.   (a) Identify the vitamin deficient in the following conditions and mention the symptoms:

(i) Impaired blood clotting

(ii) Bleeding gums

(iii) Night blindness

(iv) Anemia

(b) Comment on the importance of waxes.

(c) Compare and contrast the various forms of DNA.

(6, 3, 6)

5.   (a) Draw the structure of the following:

      (i) Histidine

      (ii) Cellobiose

      (iii) Plasmalogen

      (iv) Phosphotyrosine

      (v) Sphingomyelin

      (vi) Estradiol

      (vii) Keratan Sulfate

      (viii) Selenocysteine $(1.5 \times 8 = 12)$

(b) What are Lectins? Discuss their biological role.

(3)

6.   Write short notes on the following:

(a) Vitamin A

(b) Watson and Crick model of DNA

(c) Role of storage lipids

(d) Storage polysaccharides   (3, 4, 4, 4)

(200)

⑤   Your Roll No. 2023

Sr. No. of Question Paper : 1034   D

Unique Paper Code   : 2492011102

Name of the Paper   : Proteins (DSC-2)

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

Semester   : I

Duration : 2 Hours   Maximum Marks : 60

Instructions for Candidates

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

2. There are **6** questions.

3. Attempt any **4** questions. All questions carry equal marks.

4. Question no. **1** is compulsory.

1. A. Choose the best choice :

(a) Which of the following pairs of bonds within a peptide backbone show free rotation around both bonds?

P.T.O.

(i) Cα—C and N—Cα

(ii) C=O and N—Cα

(iii) C=O and N—C

(iv) N—C and C—Cα

(v) N—Cα and N—C

(b) A bond generally absent in cytosolic proteins but present in extracellular proteins is known as –

(i) Hydrogen bond

(ii) Disulfide bond

(iii) Ionic bond

(iv) Hydrophilic bond

(v) Van der Waal interactions

(c) An integral membrane protein can be solubilized by extraction with :

(i) A buffer of alkaline or acid pH.

(ii) A solution of high ionic strength.

(iii) A chelating agent that removes divalent cations.

(iv) A detergent solution

(v) An organic solvent

(d) A repeating structural unit in a multimeric protein is known as a(n) :

(i) Domain

(ii) Motif

(iii) Oligomer

(iv) Protomer

(v) Subunit

B. Write an example and one function of the following:

(a) Tripeptide

(b) Glycoproteins

(c) Metalloprotein

C. Give reasons for the following :

(a) The peptide bond is a semi-rigid bond

(b) CO is a silent killer.

(c) Alzheimer's disease is a proteopathy.

(d) Collagen possess very high tensile strength

(4,3,8)

2. (a) Differentiate between the following :

(i) Fibrous and Globular proteins

(ii) Motifs and domains

(iii) Parallel and Anti-parallel β strand

(iv) Tertiary and Quaternary structure

(4,4,4,3)

3. (a) Calculate the length of a linear peptide in nm having 200 amino acids, out of which 60% of residues are in α-helix and rest are in β-pleated sheets.

(b) Describe Edman degradation method of protein sequencing in detail. What are its advantages over Sanger's method?

(c) Give an account of α-Keratin structure and what makes them mechanically durable?   (4,6,5)

4.   (a) Explain the Bohr Effect and give its physiological relevance?

(b) The following steps were performed on a peptide using enzyme cleavage. Determine the amino acid sequence of the peptide.

    (i) Step 1. Treatment with trypsin yields three fragments with the following sequences WGA, AGTK, YLDR.

    (ii) Step 2. Treatment with chymotrypsin gave the following three peptide fragments: GA, LDRW, AGTKY.

(c) Give the basis of the following statements :

    (i) Fetal hemoglobin has higher affinity for oxygen

    (ii) Hemoglobin S homozygous individuals are anemic

    (iii) Hemoglobin Hill plots give variable Hills coefficient   (5,2.5,7.5)

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5. (a) Write the mechanism for the denaturation of proteins by each of the following reagents or conditions.

   (i) Urea

   (ii) High temperature

   (iii) Detergent

   (iv) Low pH

   (b) Explain the energy – entropy diagram for protein folding. Explain how chaperones assist in protein folding. (8,7)

6. Write short notes on the following :

   (a) Ramachandran plot

   (b) Prion diseases

   (c) Protein structure prediction tools (5,5,5)

[This question paper contains 4 printed pages.]

(6)　　　　　**Your Roll No.** 2023

Sr. No. of Question Paper :　**1053**　　　　　　**D**

Unique Paper Code　　　:　2492011103

Name of the Paper　　　:　Biochemical Techniques

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

Semester　　　　　　:　I

Duration :　2 Hours　　　　　　Maximum Marks : 60

Instructions for Candidates

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

2.　There are **six** questions

3.　Attempt **any four** questions.

4.　**All questions** carry equal marks.

5.　**Question No.** 1 is compulsory.

P.T.O.

1.   (a) Answer / Explain the following:

   (i) Agarose gel is preferred over polyacrylamide for electrophoresis of DNA

   (ii) Two methods used to check the purity of DNA sample

   (iii) Sedimentation rate depends on the shape and density of a molecule

   (iv) TLC is advantageous over paper chromatography

   (b) Give an example of

   (i) A substance used for density gradient chromatography

   (ii) A stationary phase used in TLC

   (iii) An extrinsic fluor

   (12,3)

2.   (a) Write the role of the following:

   (i) Vacuum pump in ultrcentrifuge

   (ii) Monochromator in a spectrophotometer

   (iii) TEMED in electrophoresis

(b) Define the following:

   (i) Sedimentation coefficient

   (ii) Bathochromic shift

   (iii) Partition coefficient

   (iv) Exclusion limit

   (v) Electrophoretic mobility

   (vi) Stokes shift   (9,6)

3. (a) Discuss the principle of affinity chromatography. What is the ligand used for purification of the following:

   (i) Immunoglobin G

   (ii) Glycoprotein

   (iii) mRNA

(b) Explain the process of fluorescence and give two applications.

(b) What are the features of an ideal chromatographic gel matrix?   (6,5,4)

4.   (a) Discuss the working of a spectrofluorimeter with the help of a diagram.

      (b) Explain the principle of gel filtration chromatography and give two applications.

      (c) Explain the technique of density gradient centrifugation.   (5,5,5)

5.   (a) Differentiate between the following:

        (i) Cation and anion exchanger

        (ii) SDS-PAGE and native gel electrophoresis

        (iii) Extrinsic and intrinsic fluor

      (b) A solution of UTP of concentration 29.3 mg/litre has an absorbance of 0.25 at 260nm. If the light path is 1.0cm and the molecular weight of UTP is 586, calculate the molar absorbance coefficient of UTP.   (12, 3)

6.   Write short notes on the following:

      (a) Different types of rotors

      (b) Iscelectric focussing

      (c) Lamberts-Beer Law   (5, 5, 5)

                                          (200)