

This question paper contains 4+2 printed pages]

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S. No. of Question Paper : 8655

Unique Paper Code : 249101

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Name of the Paper : BCHT-101 : Biomolecules

Name of the Course : B.Sc. (Hons.) Bio-Chemistry Part I

Semester : I

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. Question No. 1 is compulsory.

Use of scientific calculator/log tables may be allowed.

1. (A) Fill in the blanks :

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- (i) ..... is the biological active form of folate.
- (ii) Bees wax is rich in .....
- (iii) ..... is the most abundant class of RNA.
- (iv) ..... is the muco polysaccharide found primarily in cornea.
- (v) ..... is an imino acid.
- (vi) Steroids are derivatives of .....
- (vii) ..... is the most abundant polysaccharide in the biosphere.
- (viii) ..... is an amino acid that absorbs at 280 nm.

P.T.O.

(B) Give an example of :

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- (i) A lipid abundant in myelin sheath.
- (ii) Biologically active form of niacin.
- (iii) A standard amino acid that can link the polypeptide chains covalently.
- (iv) An enantiomer of  $\alpha$  D-glucose.
- (v) A bio-molecule other than nucleic acid that has phosphodiester bonds.
- (vi) An amino acid that can be phosphorylated.
- (vii) Pro-vitamin D.
- (viii) An epimeric pair of sugars.

(C) Give *one* significant contribution of the following :

3

- (i) E. Chargaff
- (ii) Emil Fisher
- (iii) D. Hodgkin.

2. Explain why ?

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- (i) A freshly prepared solution of glucose on standing shows a change in optical rotation.
- (ii) Fructose on reduction gives a mixture of mannitol and sorbitol.
- (iii) The  $\alpha$ -carboxyl group of amino acid is a stronger acid than the carboxylic group of comparable aliphatic acids.

- (iv) Alkali denaturation of DNA is preferred over acid denaturation.
- (v) Coconut oil contains low percentage of unsaturated fatty acids yet it has low melting point.
- (vi) Population that subsists on a corn rich diet often suffers from pellagra.
- (vii) Elaidic acid has a higher melting point than oleic acid.

3. Write the reactions (along with structures) involved (any seven) :

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- (i) Action of alkali on RNA.
- (ii) Glucose is treated with phenyl hydrazine.
- (iii) Formation of acrolein from glycerol.
- (iv) Alanine is treated with ninhydrin reagent.
- (v) Cytosine is reacted with nitrous acid.
- (vi) Synthesis of hexose from a pentose.
- (vii) Cystine is treated with  $\beta$ -mercaptoethanol.
- (viii) Methionine is oxidized with performic acid.
- (ix) Phosphatidyl choline (PC) is boiled with alkali.
- (x) Glucose is treated with conc.  $\text{HNO}_3$ .

4. Draw the structures (any 14) :

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- (i)  $16:1^{\Delta 11}$

P.T.O.

- (ii) Lysine at pH 7.0
  - (iii)  $\alpha$ -L Rhamnose
  - (iv) D-glucuronic acid
  - (v) Psuedouridine
  - (vi) Deoxycholic acid
  - (vii) Ganglioside GM1
  - (viii) Lysolecithin
  - (ix)  $\gamma$ -carboxy Glutamic acid (Gla)
  - (x) A-T base pair
  - (xi) Citrulline
  - (xii) Mono galactosyl diacyl glycerol
  - (xiii) Retinol
  - (xiv) Arachidonic acid
  - (xv) Methylcytosine
  - (xvi) Cholesterol
  - (xvii) Melibiose.
5. (A) What is the approximate number of amino acid residues present in a protein of MW 180 kilodaltons (kD) ?

- (B) Define Iodine number. A fat has low iodine number and high saponification number. What do you infer from this statement ? 3
- (C) Explain why the shape of titration curve of glycine change in the presence of formaldehyde ? 4
- (D) Name the major types of RNA in a eukaryotic cell and indicate their roles. 5
6. (A) Match the vitamin with their characteristic : 6

Vitamin	Characteristic
(1) Vitamin B <sub>12</sub>	(a) A carrier of acyl groups
(2) Niacin	(b) Its deficiency can be induced by consuming raw eggs
(3) Folic acid	(c) Many animals synthesize it from glucose
(4) Ascorbic acid	(d) Deficiency causes pernicious anemia
(5) Pantothenic acid	(e) Can be synthesized from a standard amino acid
(6) Biotin	(f) Has PABA in its structure.

- (B) Indicate any *two* roles of waxes. 2
- (C) A disaccharide containing only glucose was exhaustively methylated and acid hydrolyzed. The only products obtained were 3, 4, 6 tri O-methyl D-glucose and 2, 3, 4, 6 tetra O-methyl glucose. Deduce the structure of disaccharide. 4
- (D) Nucleosides are more soluble in water than corresponding bases. Explain. 2

7. Compare the following pairs : 3,3,3,2.5,2.5
- (i) Z-DNA and B-DNA
  - (ii) Amylopectin and glycogen
  - (iii) Plant and animal sterols
  - (iv) Racemic mixture and meso form
  - (v) Androgen and estrogen.
8. (A) Write short notes (any *three*) : 12
- (i) Role of Lipoproteins
  - (ii) Cell wall structure in gram positive bacteria
  - (iii) Biologically active peptides
  - (iv) Blood group polysaccharides.
- (B) Chargaff's rules are not universal. Explain. 2