

This question paper contains 4 printed pages.

5951

Your Roll No.

B.Sc. (Hons.) Bio-Chemistry / I Sem.

B

Paper— BCHT-101 : Biomolecules

Time : 3 hours

Maximum Marks : 75

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

Answer five questions in all, including Q. No. 1, which is compulsory.

1(a) Fill in the blanks.

- (i) The optically inactive amino acid found in proteins is _____.
- (ii) _____ is the deoxyhexose sugar found in blood group antigens.
- (iii) N-linked glycoproteins contain oligosaccharides linked to _____ residues.
- (iv) The amino acid _____ can be converted to aspartic acid on treatment with strong acid.
- (v) Oleic acid is converted to its trans form _____ on heating with certain catalysts.
- (vi) Acidic glycolipids are _____ charged because of the presence of _____.
- (vii) A sample of DNA is found to contain 25% adenine the percentage of guanine is _____.
- (viii) Vitamin _____ occurs in nature as a component of coenzyme A and acyl carrier protein.

(1x8 = 8)

(b) Justify the following statements:

- (i) At pH 6.0, aspartic acid is positively charged.
- (ii) Aldohexoses can exist as 16 optical isomers.

(2x2 =4)

(c) Give one example with its structure for each of the following:

- (i) An epimer of galactose.

Turn over

- (ii) A non-proteinaceous amino acid.
- (iii) An amino acid that acts as biological buffer.
- (iv) A polysaccharide whose monomer is fructose.
- (v) Plant sterol.
- (vi) A cyclic nucleotide.
- (vii) An anti-coagulant mucopolysaccharide.

(1x7 = 7)

2(a). Write the structures of following:

- (i) Ascorbic acid
- (ii) Lysine
- (iii) Chitin
- (iv) GABA
- (v) Sialic acid
- (vi) Galactosyl cerebioside
- (vii) Arachidonic acid.
- (viii) Tetrahydrofolate
- (ix) Pseudomidine
- (x) Vitamin B₆ coenzyme

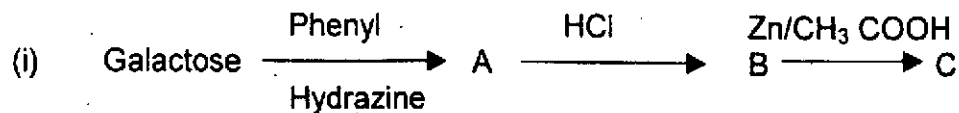
(1x10 = 10)

(b) Give biological significance of:

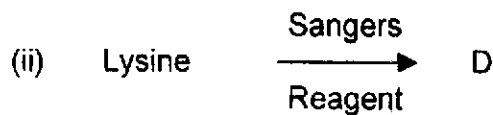
- (i) Glutathione
- (ii) Trehalose
- (iii) Phospholipid inositol
- (iv) Vitamin K.

(1x4 = 4)

3(a). Identify and write the structures of the products A, B, C, D as applicable.



(2)



(1)

- (b) How many grams of glycine does a 2M aqueous solution of glycine contain? (2)
- (c) Differentiate between A, B and Z conformations of DNA. (4)
- (d) Differentiate between chylomicrons, HDL, LDL and VLDL (5)
4. Give reason for following statements:
- (a) The enzyme hydrolyzing sucrose is also called as invertase.
 - (b) Mucopolysaccharides have shock absorption and lubrication properties.
 - (c) O group humans are universal donors.
 - (d) Antioxidants are added to preserve butter from becoming rancid.
 - (e) Hyperchromicity is observed when double stranded DNA is converted to single stranded DNA.
 - (f) Biological membranes have amphipathic molecules.
 - (g) Diabetics have high blood glucose levels.
- (2x7=14)
- 5(a) Differentiate between the following with structure:
- (i) Gram positive and Gram negative bacterial cell wall.
 - (iii) Starch and cellulose
 - (iv) Nucleotide and nucleoside
 - (v) Lecithins and cephalins
- (3x4=12)
- (b) Mention and give structures of the products obtained on treatment of glycogen with methyl iodide followed by its acid hydrolysis. (2)
- 6(a) Draw the following oligopeptides in their predominant ionic forms at pH 7.0
- (i) Phe-Met-Arg
 - (ii) Tryptophenyl lysyl aspartic acid
- (2+2)
- (b) The specific rotation of a freshly prepared solution of glucose changes with time and reaches a stable value. Explain the observation. (3)

- (c) (i) Calculate the length of double stranded DNA molecule of mol. wt. 3×10^7 (mol. wt. of one base pair = 660 da).
(ii) How many helical turns does a 'Z' molecule of DNA and a 'B' molecule of DNA with same molecular weight have? (2+3)
- (d) Name two vitamins that act like hormones. (2)

7. Write short notes on the following:

- (i) Titration curve of glycine
- (ii) t-RNA
- (iii) Vitamin E
- (iv) Prostaglandins

(3.5 x 4 = 14)

8. Write the following reactions:

- (a) Synthesis of D-ribose from D-glyceraldehyde
- (b) Alanine reacts with ninhydrin reagent
- (c) Cystine reacts with Cleland's reagents
- (d) Pyrimidine reacts with hydrazine
- (e) Action of nitrous acid on cytosine
- (f) Triacylglycerol reacts with base
- (g) Reduction of Fructose.

(2x7 = 14)