This question paper contains 4 printed pages. **Your Roll No. .....**

Sl. No. of Ques. Paper : **1767** **GC-3**

Unique Paper Code : **32491101**

Name of Paper : **Molecules of Life**

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

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. Subparts of the questions should be attempted together. Use of scientific calculator / log tables may be allowed.

1. (a) Fill in the blanks:

(i) _____ is biologically active form of riboflavin.

(ii) _____ is an imino acid.

(iii) _____ is a plant sterol.

(iv) ____ is a disaccharide found in milk.

(v) _____ is a lipid abundant in myelin sheath.

(vi) _____ amino acid shows absorption maxima at 260 nm.

(vii) ____ type of DNA predominantly exists in solutions devoid of water.

(viii) _____ is the main structural polysaccharide of exoskeleton of arthropods. 8

(b) Write an example of:

(i) An amino acid with negative charge at pH 7.0.

(ii) A fat soluble vitamin, deficiency of which results in Rickets.

(iii) A proteoglycan.

(iv) Most abundant polysaccharide in biosphere.

(v) *n-3* Fatty acid

(vi) A sulphur containing amino acid

(vii) Biologically active form of Niacin

(viii) A galactolipid 8

(c) Define the following:

(i) Zwitterion

(ii) Isoelectric pH

(iii) Essential fatty acids. 3

P.T.O.

2. Explain why:

(a) Fructose on reduction gives a mixture of mannitol and sorbitol.

(b) Carboxylic group of alanine is much stronger acid than the carboxylic group of acetic acid.

(c) Free nucleotides show higher absorption at 260 nm compared to nucleic acid.

(d) Eliadic acid has a higher melting point than oleic acid even though both are 18-carbon monounsaturated fatty acids.

(e) Sucrose hydrolysing enzyme is called invertase.

(f) Hypervitaminosis can occur in case of fat soluble vitamins.

(g) DNA is stable towards alkali treatment whereas RNA is not. 14

3. Draw the structures of (any *fourteen*):

(a) Maltose

(b) Cysteine at pH 7.0

(c) 5-Methylcytidine

(d) Phosphatidyl serine

(e) Deoxyribose

(f) FAD

(g) D-Glucouronic acid

(h) Retinol

(i) A bile acid

(j) *N*-acetyl glucosamine

(k) Palmitoleic acid

(l) Inositol triphosphate

(m) Uridine

(n) D-Fructose

(o) Platelet activating factor

(p) TAG

(q) Citrulline. 14

4. (a) Discuss the biological roles of glycosaminoglycans giving suitable examples. 5

(b) Discuss why DNA is best suited as a carrier of genetic information. 5

(c) How do chain length and unsaturation affect the properties of a fatty acid? 4

5. (a) Match the following:

Vitamins	Characteristics
(i) FAD	(a) deficiency results in clotting disorder
(ii) Thiamin	(b) biologically active form of thiamin
(iii) Niacin	(c) coenzyme form of folic acid
(iv) TPP	(d) coenzyme form of vitamin A
(v) Vitamin E	(e) derived from riboflavin
(vi) THF	(f) deficiency results in pellagra
(vii) Retinal	(g) deficiency causes beri beri
(viii) Vitamin K	(h) serves as an antioxidant 8

(b) Name the nucleotide that:

(i) Acts as a second messenger

(ii) Is a component of enzyme co-factors

(iii) Is a central carrier of chemical energy in a cell. 3

(c) Calculate the pH of a dilute solution that contains a molar ratio of potassium acetate to acetic acid as 1 : 3. (pKa = 4.76) 3

6. (a) Differentiate between:

(i) Cellulose and amylose

(ii) Phospholipids and sphingolipids

(iii) Essential and non-essential amino acids. 4,4,2

(b) What is T_m? How does base content affect the melting temperature of DNA? 4

7. (a) Give an example of a pair of sugars that are related to each other as

(i) Anomer

(ii) Epimer

(iii) Diastereomer

(iv) Enantiomer. 4

(b) Draw the titration curve of alanine and discuss what information can be derived from the titration curve of an amino acid. 6

(c) List the biological processes mediated by lectins. 4

8. Write short notes on following:

(a) Waxes

(b) Buffers

(c) Eicosanoids

(d) Mutarotation. 14