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Your Roll No

5800

J

B.Sc. (Hons.)/I

BIOCHEMISTRY—Paper V

(Introduction to Biology and Chemistry of Biologically
Important Molecules)

Time 3 Hours

Maximum Marks 60

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

Attempt Five questions in all,

including Q No 1 which is compulsory

- 1 (a) Justify the following statements $15 \times 4 = 60$
- (i) Bacteria grown at low temperature start synthesizing more unsaturated fatty acids
 - (ii) Cellulose and amylose are both homopolymers of glucose yet have very different structural and physical properties
 - (iii) In aqueous solution salts of fatty acids form micelles whereas phospholipids form bilayers
 - (iv) RNA is more versatile in its structure and function compared to DNA

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- (b) Name the following 10
- (i) Most variable phase of the cell cycle
 - (ii) A cell organelle with its own genome
 - (iii) A cell organelle with pH lower than the cells pH
 - (iv) Repeating unit in Chitin
 - (v) Most abundant polysaccharide on earth
 - (vi) A sulphhydryl group containing amino acid
 - (vii) The class of RNA that is most abundant in a cell
 - (viii) Lipid that works as a surfactant in lungs
 - (ix) A vitamin that can become deficient with excessive raw egg white consumption
 - (x) An amino acid which is optically inactive
- 2 (a) A mixture of cholesteryl ester, phosphatidyl choline, cholesterol, monoacyl glycerol and di-acylglycerol was separated by thin layer chromatography, where the most hydrophobic lipid moved the farthest. Draw a chromatogram to show the position of each of these lipids 5
- (b) Write the structures of aspartic acid at pH = 7 and at pH = 11 3

- (c) Identify the following 3
- (i) A lipoprotein that supplies lipids of dietary origin to the liver
 - (ii) A lipoprotein that cells take up by receptor mediated endocytosis
 - (iii) A lipoprotein with highest density
- 3 Draw the structures (any 11) of the following 11
- (i) Pentamethyl D-glucopyranose
 - (ii) α -L Iduronate
 - (iii) Cyclic AMP
 - (iv) 1,2 euediol of galactose
 - (v) Ornithine
 - (vi) Cardiolipin
 - (vii) Flavin mononucleotide
 - (viii) Trehalose
 - (ix) Sialic acid
 - (x) Pseudouridine
 - (xi) Phosphatidal choline
 - (xii) Ceramide
 - (xiii) Methionine
 - (xiv) Galactose
 - (xv) Lactose

- 4 (a) Match the vitamins with their characteristics 5
- (i) B₁₂ — Its co-enzyme form is a carrier of acyl group
 - (ii) Niacin — Many animals synthesize it from glucose
 - (iii) Folic acid — Deficiency causes pernicious anaemia
 - (iv) Ascorbic acid — A vitamin that can be synthesized from a standard amino acid in the body
 - (v) Pantothenic acid — Has GABA in its structure

(b) Give the scientific contribution of the following

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- (i) Sauger
- (ii) Rosalind Franklin
- (iii) Emil Fischer
- (iv) E Chargaff
- (v) Hershey & Chase
- (vi) Watson & Crick

- 5 (a) Why is triacylglycerol best suited for long term storage of energy? 2

(b) Complete the following reactions (Any six)

$$6 \times 1\frac{1}{2} = 9$$

- (i) KOH with triolein
- (ii) HCl with fructose
- (iii) 1-fluoro, 2,4 dinitro benzene with leucine
- (iv) Nitric acid with skin
- (v) Phospholipase-C with Phosphatidyl-glycerol
- (vi) RNA with alkali
- (vii) Phenyl hydrazine with mannose

6 (a) Write short notes on the following (Any three)

$$3 \times 3 = 9$$

- (i) Bacterial cell wall polysaccharides
- (ii) Prostaglandins
- (iii) Role of Retinal in vision
- (iv) Calcitriol

(b) Define Iodine number and explain its application in characterization of an oil sample 2

7 (a) Differentiate between any five of the following

$$5 \times 2 = 10$$

- (i) Anomers and Epimers
- (ii) Configuration and Conformation
- (iii) Z-DNA and B-DNA
- (iv) t-RNA and m-RNA

- (v) Gangliosides and Cerebrosides
- (vi) Essential and non-essential amino acids
- (b) Mention the application of the polysaccharide 'agar' in a Biochemical Laboratory 1
- 8 (a) Compare the structure and function of mitochondria with chloroplast 2 5
- (b) Explain Mutarotation 2 5
- (c) Give the biological importance of the following
- 1 5 × 4 = 6
- (i) Glutathione
- (ii) Vit K
- (iii) Bile acids
- (iv) Insulin