7/12/18

[This question paper contains 6 printed pages.]

19

Your Roll No.....

Sr. No. of Question Paper : 18 **I**

Unique Paper Code : 32491101

Name of the Paper : Molecules of Life

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

Semester : I

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all. Question No. **1** is compulsory.
3. Use of scientific calculator/log tables may be allowed.

1. (a) Name the following :

   (i) A deoxy hexose

   (ii) A standard imino acid

   (iii) A storage lipid found in planktons

   (iv) An eicosanoid

   (v) A storage polysaccharide

P.T.O.

(vi) An amino acid that can be phosphorylated

(vii) A modified amino acid found in muscle protein

(viii) A modified pyrimidine base

(ix) An essential fatty acid (9)

(b) Explain the following :

(i). Elaidic acid and oleic acid both are 18 carbon monounsaturated fatty acids, however elaidic acid is solid at room temperature whereas oleic acid is liquid.

(ii) Base composition of DNA affects its melting temperature.

(iii) Alpha carboxylic group of alanine is a stronger acid than the carboxylic group of acetic acid.

(iv) Nucleosides are more soluble in water than corresponding bases.

(v) Glucose, Mannose and Fructose are inter-convertible in an alkaline solution. (2×5=10)

2. Draw structures of the following :

(a) Platelet activating factor

(b) Glycine at pH 12

(c) Sorbitol

(d) Tryptophan

(e) Pseudouridine

(f) 1,2 diacylglycerol

(g) Lactose

(h) cAMP

(i) D-Glucuronic acid

(j) Vitamin D_3

(k) N-Acetyl galactosamine

(l) Ascorbic acid

(m) Phosphatidyl choline

(n) Ornithine (14)

3. (a) Write reactions for the following :

(i) Fructose is reduced

(ii) RNA is treated with an alkali

(iii) Phosphatidyl choline is treated with Phospholipase A2

(iv) Cystine is treated with a reducing agent

(v) Acid hydrolysis of Sucrose (2×5)

(b) Identify the following amino acids :

(i) An aromatic amino acid with highest absorbance at 280 nm

(ii) An amino acid which acts as a methyl group donor

(iii) A modified amino acid found in prothrombin and other calcium binding proteins

(iv) An amino acid that contains an imidazole group (4)

4. (a) Name the vitamin deficient in the following conditions :

(i) Night blindness

(ii) Impaired blood clotting

(iii) Megaloblastic anemia

(iv) Bleeding gums

(v) Beri Beri

(vi) Pellagra (6)

(b) Discuss the role of proteoglycans in extra cellular matrix. (4)

(c) How are oligosaccharides linked to proteins in glycoproteins? (4)

5. Compare the following :

(i) Phospholipids and galactolipids

(ii) Cellulose and Amylose

(iii) Thromboxanes and leukotrines

(iv) tRNA and mRNA (3.5×4)

6. (a) Compare the membrane lipids in Archaea, plant cell and mammalian cell. (6)

(b) Calculate the pH of a solution when 1ml of 10M NaOH is added to 1L of pure water at pH 7.0. (4)

(c) What information can be derived from the titration curve of an amino acid? (4)

7. (a) Discuss the role played by nucleotides other than formation of nucleic acids. (4)

(b) Why are triacylglycerols (TGs) best suited for long term storage of energy? (3)

(c) How is the pH of blood maintained? (4)

(d) Discuss the structural features of the peptidoglycan coat of a bacterial cell. (3)

8. Write short notes on the following :

(i) Waxes

(ii) Glycosaminoglycans

(iii) Sterols

(iv) Watson& Crick model of DNA (3.5×4)

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S. No. of Question Paper : **19**

Unique Paper Code : **32491102**

Name of the Paper : **Cell Biology**

Name of the 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,

including Question No. **1** is compulsory.

1. (A) State true or false :

(*a*) Microvilli are microtubule based structures.

(*b*) The polarity of actin filament is important for muscle contraction.

(*c*) Deficiency of vitamin C causes weakened connective tissue.

P.T.O.

(*d*) Intermediate filaments play a major role in cytokinessis.

(*e*) The luminal membrane of endoplasmic reticulum is topologically equivalent to the outer leaflet of the plasma membrane.

(*f*) Mitochondria is the largest organelle of animal cell.

(*g*) Adjacent plant cells are linked by plasmodesmata.

(*b*) Write the localization and function of each of the following :

(*a*) PDI

(*b*) Emerin

(*c*) Connexin

(*d*) Integrin

(*e*) Succinate dehydrogenase

(*f*) Separase. 7,12

2 (A) Differentiate between the following :

(*i*) Mitosis and Meiosis.

(*ii*) Differential centrifugation and Density gradient centrifugation.

(*iii*) Hemidesmosomes and Desmosomes. 4×3

(B) Mitochondria are semi-autonomous organelles Comment. 2

3 (A) Draw a well labeled structure of nuclear pore complex.

(B) Draw and describe the mitochondrial genome and give its significance.

(C) E. coli is widely used as an experimental model. Comment. 5,5,4

4 (A) Differentiate between microtubules, intermediate filaments and actin filaments.

(B) Give a brief account of MAPs present in the cell.

(C) A mature human egg/sperm has X amount of DNA. How much DNA does a somatic cell have ?

(*i*) In G1 phase

(*ii*) In G2 phase

(*iii*) At the end of mitosis

(*iv*) At the end of meiosis II. 6,4,4

5. (A) Draw well labeled diagrams of the following :

(*a*) Chloroplast genome

(*b*) Structure of axoneme of flagella

(*c*) Adherence Junctions.

(B) An egg is injected with two globular proteins, one 15 k Da and the other 100 k Da both of which lack nuclear localization signals. Will either protein enter the nucleus ? Give reasons. 4,4,4,2

6 (A) Explain the salient features of transformed cells.

(B) Explain how tight junctions help in maintaining cell polarity.

(C) Compare and contrast the composition and structure of primary and secondary cell wall of plants. 5,4,5

7. (A) Discuss the organization and functions of Golgi apparatus.

(B) Explain the functions of smooth endoplasmic reticulum.

(C) Discuss briefly endosymbiotic origin of organelles. 5,5,4

8. Write short notes on :

(*a*) Apoptosis

(*b*) Plastids

(*c*) MPF

(*d*) Zellweger syndrome. 3.5×4