BIOCHEMISTRY
(BIOT 2103)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Maple syrup urine disorder prevents normal breakdown of
(a) Leucine (b) Isoleucine
(c) Valine (d) Serine.

(ii) In Eukaryotes fatty acid breakdown occurs in
(a) mitochondrial matrix (b) cytosol
(c) cell membrane (d) ER.

(iii) Which of the statements about G-proteins is false?
(a) They are involved in signaling cascade
(b) They bind to and are regulated by guanine nucleotides
(c) They become activated when bound to GDP
(d) G-proteins are also known as Serpentine receptors.

(iv) Which of the following acts to increase the release of Ca^{++} from the ER?
(a) Diacylglycerol (DAG) (b) Inositol Tri Phosphate
(c) Calcitonin (d) None of the above.

(v) Pyruvate dehydrogenase complex is similar to
(a) α-keto gluterate dehydrogenase (b) succinate dehydrogenase
(c) glyceraldehyde 3-P dehydrogenase (d) none.

(vi) In α oxidation which of the following products is released.
(a) CoA (b) CO_2 (c) H_2O (d) Acetyl CoA.

(vii) Long chain fatty acids are first activated to acy CoA in the
(a) Cytosol (b) Mitochondra
(c) Microsomes (d) Lysosomes.

(viii) Long chain acyl-CoA penetrates mitochondria in the presence of:
(a) palmitate (b) carnitine (c) sorbitol (d) DNP.

(ix) Which enzyme converts cAMP to ordinary AMP?
(a) Phosphodiesterase (b) Phosphoesterase
(c) Esterase (d) None of these.

(x) Which enzyme converts GTP to cyclic GMP?
(a) Guanylyl cyclase (b) Adenyl cyclise
(c) Both (a) and (b) (d) none of these.

Group – B

2. (a) What are allosteric enzymes? Give example.

(b) Discuss with a flow chart the pay off phase of glycolysis.

(c) Which step of this phase is bypassed in gluconeogenesis and how?

(d) Explain the hormonal regulation of glucose metabolism.

(2 + 2) + 4 + 2 + 2 = 12

3. (a) Explain with the help of a schematic diagram the different phases of PPP pathway of a cell mentioning significance of each phase.

(b) What are photosystems? How many photosystems are present in higher plants? Mention the structural components and function of them in plant.

(c) Write schematically the photosynthetic electron transport chain.

4 + (1 + 1 + 2) + 4 = 12

Group – C

4. (a) What is the backbone of steroid hormone?

(b) How is cholesterol formed?

(c) State the functions of different types of phospholipids.

2 + 4 + 6 = 12

5. (a) What is Ω- oxidation of fatty acids? Describe the pathway by using an example?

(b) Is there any difference between even and odd numbered fatty acids in terms of β – oxidation?

(c) Explain the main steps in terms of products formed in β- oxidation by giving suitable example of reaction pathways of one odd and one even fatty acids.

4 + 2 + 6 = 12

Group – D

6. (a) How PRPP levels influence purine and pyrimidine nucleotide synthesis?

   (b) How are folate cofactors involved in nucleotide metabolism?

   (c) What is glutathione? Describe its synthesis and function in cell.

4 + 4 + 4 = 12

7. (a) Discuss the catabolism of tyrosine.

   (b) How excess ammonia is excreted in the following animals (birds, mammals, frog)?

   (c) Name two key nucleotides for uric acid formation. Are those purine or pyrimidine?

   (d) How uric acid is formed from hypoxanthine?

3 + 3 + 3 + 3 = 12

Group – E

8. (a) What is an amplification cascade? Describe with example.

   (b) Describe briefly any two cell signaling cascades.

6 + 6 = 12

9. (a) Differentiate between ligand and second messenger.

   (b) Using an example describe the pathway by which a G-protein works.

   (c) Distinguish between intracellular and cell surface receptors using examples.

4 + 4 + 4 = 12