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) The net gain of ATP molecule resulting from complete oxidation of 1 molecule of glucose is
(a) 2 (b) 4 (c) 32 (d) 38.

(ii) In purine ring biosynthesis, number of formal-tetrahydrofolate required is
(a) one (b) two (c) three (d) four.

(iii) TCA cycle is
(a) catabolic (b) amphibolic (c) anabolic (d) cyclic.

(iv) Which of these is not involved in pentose phosphate pathway?
(a) NADPH (b) CO_2
(c) Glutathione (d) Ribulose 5- phosphate.

(v) Hydrolysis of phosphatidic acid by phosphatidic acid phosphatase yields
(a) 1, 2-diacylglycerol (b) 1, 3-diacylglycerol
(c) 1, 4-diacylglycerol (d) 1, 5-diacylglycerol.

(vi) Which of the following is not a G-protein coupled receptor?
(a) Glycine Receptor (b) Adrenergic Receptor
(c) Glutamate Receptor (d) Muscarinic Receptor.

(vii) The first intermediate in cholesterol synthesis is
(a) Mevalonate (b) Isoprene
(c) Squaline (d) Ethylene.

(viii) Which of the following catalyzes the cutting of PIP2 into 2 moles of IP3 and diacylglycerol in cell signaling?
(a) Phosphokinase C (b) Phospholipase C
(c) Lipokinase (d) Phosphodiesterase C.

(ix) Which of the following is the major point of regulation on the pathway to cholesterol?
(a) Thiolase (b) HMG-CoA synthase
(c) HMG-CoA reductase (d) Pyruvate Kinase.

(x) Which second messenger signals the release of Ca+2 from endoplasmic reticulum?
(a) IP3 (b) 1, 2 diacylglecerol
(c) cAMP (d) cGMP.

Group – B

2. (a) Discuss the lock and key model for enzyme activity.

(b) How blood glucose level is regulated in mammals by hormone and cAMP?

(c) Discuss the role of glycogenin protein in glycogen biosynthesis.

4 + 4 + 4 = 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) Write schematically the photosynthetic electron transport chain.

(c) What are the different phases in the dark reaction of photosynthesis? What are C3 and C4 plants? Which of them is advantageous and why?

4 + 4 + (2 + 2) = 12

Group – C

4. (a) Describe the main steps behind α-oxidation of Fatty Acids.

(b) What is co-enzyme A and describe its structure and function.

6 + 6 = 12

5. (a) What are peptide hormones? How do they differ from steroid hormones?

(b) Give an account of their storage and release of peptide hormones.

(2 + 4) + 6 = 12

Group – D

6. (a) Describe with a suitable example the transammination reaction. Discuss the role of vitamin B_6 in transammination.

(b) Discuss the catabolism of any one glucogenic amino acid.

(c) Mention the cause of Lesch-Nyhan syndrome.

(d) What is glutathione?

(3 + 2) + 3 + 2 + 2 = 12

7. (a) Describe the salvage pathway for purine biosynthesis.

(b) Discuss urea cycle.

(c) How PRPP levels influence purine and pyrimidine nucleotide synthesis?

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

3 + 3 + 3 + 3 = 12

Group – E

8. (a) What is a G-protein. Explain the activation and deactivation with the help of G-protein cascade. (using G-protein GTPase cycle as an examble)

(b) How can G-protein linked pathways be desensitizied.

(2 + 4) + 6 = 12

9. (a) Distinguish between primary and secondary messengers.

(b) Describe the importance of scaffolding proteins and relay proteins during signal transduction.

(c) Explain how glycogen synthase is activated by insulin so as to cause glucose uptake.

2 + 4 + 6 = 12