BIOCHEMISTRY
(BTC2103)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) Mutases facilitates
(a) transfer of H between two molecules
(b) transfer of functional group between two different molecules
(c) formation of double bond
(d) transfer of functional group within the same molecule.

(ii) Allosteric enzymes follow
(a) Michaelis-Mentenkinetics (b) Non-Michaelis-Mentenkinetics
(c) First order kinetics (d) Zero order kinetics.

(iii) The no. of ATP molecule produced by substrate level phosphorylation in glycolysis of 1 molecule glucose is
(a) 2 (b) 4 (c) 32 (d) 38

(iv) β-oxidation takes place in
(a) Mitochondria (b) Cytoplasm
(c) Chloroplast (d) Nucleus

(v) Which one is an example of ketone body?
(a) Acetoacetate (b) Acetone
(c) Pyruvate (d) Both (a) and (b).

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

(vii) One example of ketogenic amino acid is
(a) Alanine (b) Glycine
(c) Glutamine (d) Leucine

(viii) Maple syrup urine disease results from
(a) Tyrosinase (b) Homogentisate dioxygenase
(c) Phenylalanine hydroxylase (d) Branched chain aminotransferase

(ix) Example of a second messenger is
(a) Camp (b) ATP (c) GTP (d) Wnt

(x) Which of the following catalyses the cutting of PIP_2 into 2 moles of IP_3 and DAG in cell signalling?
(a) Phosphokinase C (b) Phospholipase C
(c) Lipokinase (d) Phosphodiesterase C.

Fill in the blanks with the correct word

(xi) The cofactors of pyruvate dehydrogenase complex are _____.

(xii) An example of a derived lipid is _____

(xiii) Lactose intolerance is the result of deficiency of _____.

(xiv) Kreb's bicycle is another name of _____.

(xv) G-protein coupled receptors contain _____ transmembrane α helices.

Group - B

2. (a) What are allosteric enzymes? Why are they named so? Discuss with example the regulatory action of any one allosteric enzyme. *[(CO3)(Analyse/HOCQ)]*
(b) Write down the pay-off phase of glycolysis in a flow chart mentioning all enzymes, coenzymes and irreversible steps. Why it is called so? What is the actual oxidation step? *[(CO2)(Remember/IOCQ)]*

6 + 6 = 12

3. (a) Show by a schematic diagram the flow of electron in oxidative electron transport chain. *[(CO4)(Remember/IOCQ)]*
(b) Explain the theory proposed for ATP production by ETC. Show how ATP is produced by ATP synthase. *[(CO2)(Apply/IOCQ)]*
(c) Explain how the lactic acid produced by in muscles of heavy mammals during heavy exercise are metabolised? *[(CO2)(Apply/IOCQ)]*

4 + 4 + 4 = 12

Group - C

4. (a) Why does activation of fatty acids require two ATP equivalents? *[(CO4)(Analyze/IOCQ)]*
(b) Give a detailed comparison of fatty acid degradation and its biosynthesis. *[(CO4)(Understand/LOCQ)]*
(c) Analyse the antagonizing effects of insulin and glucagon. *[(CO4)(Analyze/IOCQ)]*

4 + 4 + 4 = 12

5. (a) How plasmalogen is synthesized? Mention the inter conversion reactions of phospholipids. *[(CO4)(Apply/IOCQ)]*

(b) What are ketone bodies? How are ketone bodies formed? Why is ketosis deadly? *[(CO4)(Understand/LOCQ)]*

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

Group - D

6. (a) What are essential and non-essential amino acids? Why they are called so? Give example. *[(CO3)(Analyse/HOCQ)]*
   (b) Write a short note on urea cycle. *[(CO4)(Remember/LOCQ)]*
   (c) Discuss any two amino acid catabolic disorder. *[(CO2)(Apply/IOCQ)]*

3 + 5 + 4 = 12

7. (a) Describe with an example the importance of transamination reaction in amino acid catabolism. What is the role of vitamin B_6 here? *[(CO4)(Analyse/HOCQ)]*
   (b) Discuss the catabolism of any one glucogenic amino acid. *[(CO4)(Apply/IOCQ)]*
   (c) Discuss the synthesis of any one neurotransmitter. *[(CO4)(Apply/IOCQ)*]

(4 + 2) + 3 + 3 = 12

Group - E

8. (a) What are the different properties of cell signalling? *[(CO6)(Remember/LOCQ)]*
   (b) Explain in detail the function and structure of Calmodulin. *[(CO6)(Apply/IOCQ)]*
   (c) What are the role of second messengers? Analyse six different classes of cell signalling. *[(CO6)(Analyse/IOCQ)]*

4 + 4 + 4 = 12

9. (a) Describe the insulin signalling cascade. *[(CO6)(Remember/LOCQ)]*
   (b) Decipher the role of insulin in activating glycogen synthase. *[(CO6)(Analyse/IOCQ)]*
   (c) What is working principle of JAK-STAT pathway? *[(CO6)(Remember/LOCQ)]*

4 + 4 + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	28.13	56.25	15.62