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) Example of a second messenger is:
(a) cAMP (b) ATP (c) GTP (d) Wnt

(ii) How many no. of enzymatic steps are required during gluconeogenesis in comparison to reverse glycolysis?
(a) 1 (b) 2 (c) 3 (d) 4

(iii) TCA cycle is _____ in nature.
(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) Which of the following form of lipids are referred to as neutral lipids?
(a) TGL (b) Steroids
(c) Phospholipids (d) Wax

(vi) Alanine is deaminated to produce _____
(a) pyruvicacid (b) citricacid
(c) oxalicacid (d) fumericacid

(vii) Pyruvate dehydrogenase complex is similar to _____
(a) α-ketogluteratedehydrogenase (b) succinatede hidrogenase
(c) glyceraldehyde 3-P dehydrogenase (d) none

(viii) The coenzyme involved in transfer of acetyl group is _____
(a) NADH (b) Coenzyme A
(c) S-adenosylmethionine (d) Biotin

(ix) Which of the following signal molecules does not interact with cell surface receptors?
(a) Insulin (b) Glucagon
(c) Testosterone (d) Gastrin

(x) Which of the following is a cell surface receptor?
(a) Enzyme-linked receptors (b) Ion channel linked receptors
(c) G protein-linked receptors (d) All of the above

Group- B

2. (a) What are allosteric enzymes? Explain its mechanism of action with a suitable example. [(CO1)(Analyze/IOCQ)]
(b) Discuss TCA cycle with a flow chart, mentioning all enzymes and co-enzymes. [(CO2) (Remember/LOCQ)]
(c) Mention the feeder pathways of glycolysis. [(CO2) (Understand/LOCQ)]

4 + 4 + 4 = 12

3. (a) What are the two phases of glycolysis and why they are called so? [(CO2) (Remember/LOCQ)]
(b) Explain with schematic diagram the mechanism of action of pyruvate dehydrogenase complex. [(CO4)(Analyse/IOCQ)]
(c) What is the difference between TCA cycle and glyoxalate cycle? [(CO3) (Understand/LOCQ)]

3 + 5 + 4 = 12

Group - C

4. (a) How are fatty acid synthesis and fatty acid degradation pathways are related to each other? Illustrate using a suitable example and flow chart. [(CO5) (Understanding/LOCQ)]
(b) Deduce the β-oxidation pathway of oleic acid using oleic acid as an example. [(CO5) (Analyze/IOCQ)]

6 + 6 = 12

5. (a) Classify the different types of steroid hormones in terms of functions. [(CO3)(Understand/LOCQ)]
(b) How is cholesterol regulated? Draw a flow chart for synthesis of cholesterol. [(CO3) (Analyze/IOCQ)]
(c) Disorders of lipid metabolism give rise to atherosclerosis - Justify this statement. [(CO3)(Evaluate/HOCQ)]

4 + 4 + 4 = 12

Group - D

6. (a) Describe the transammination reaction with a suitable example. [(CO4) (Remember/LOCQ)]

(b) Discuss the role of vitamin B_6 in transammination. [(CO4) (Analyze/IOCQ)]
(c) Analyze the cause of Lesch-Nyhan syndrome. [(CO4) (Analyze/HOCQ)]

4 + 4 + 4 = 12

7. (a) Discuss the catabolism of : Arginine or Leucine. [(CO4) (Remember/LOCQ)]
(b) Discuss how protein degradation takes place by different pathways. [(CO5) (Understand/LOCQ)]
(c) Name two key nucleotides for uric acid formation. How uric acid is formed from hypoxanthine? [(CO4)(Analyze/HOCQ)]

4 + 4 + (1 + 3) = 12

Group - E

8. (a) Illustrate the cell-cell communication process by using a suitable example. [(CO3) (Understanding/LOCQ)]
(b) No cell is an island - Criticize this statement using appropriate examples. [(CO3) (Evaluate/HOCQ)]
(c) Analyze the various properties of cell signalling. [(CO3)(Analyze/IOCQ)]

4 + 4 + 4 = 12

9. (a) Discuss in detail the β-adrenergic pathway and its deactivation. [(CO5) (Discuss/IOCQ)]
(b) By using a suitable example illustrate and derive the amplification cascade of glucose. [(CO2) (Analyze/IOCQ)]

6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	45%	49%	6%

Course Outcome (CO):

After completion of this course, the students will be able to:

1) Explain the basic concepts of enzymes.
2) Understand carbohydrate metabolism and ATP synthesis.
3) Understand and grasp knowledge about metabolism of lipid, vitamin and hormone.
4) Gain knowledge about N-metabolism and its disorders.
5) Understand the importance of various intracellular signaling pathways.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question

Department & Section	Submission Link
BT	https://classroom.google.com/w/NDIzNjY2OTA2MjMz/tc/NDY3NTg1MTg4Mjk4