

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 cofactors of pyruvate dehydrogenase complex are:
(a) Folate and TPP (b) FAD and NAD+
(c) NADH and Nicotinic acid (d) all of these.
- (ii) Which of the following is not a type of signalling molecule?
(a) Testosterone (b) Insulin (c) Thyroxin (d) Adenylate cyclase.
- (iii) Allosteric enzymes are
(a) larger than simple enzyme
(b) smaller than simple enzyme
(c) larger and more complex than simple enzyme
(d) smaller and less complex than simple enzymes.
- (iv) The two key enzymes of glyoxalate cycle are:
(a) Isocitrate lyase and isocitrate dehydrogenase
(b) α keto glutarate dehydrogenase and isocitrate dehydrogenase
(c) Isocitrate lyase and malate dehydrogenase
(d) Isocitrate lyase and malate synthase.
- (v) The metabolite that finally enters TCA cycle is:
(a) Pyruvate (b) Ethanol (c) Acetyl CoA (d) Lactate.
- (vi) The coenzyme involved in transfer of acetyl group is
(a) NADH (b) Coenzyme A (c) S-adenosyl methionine (d) Biotin.
- (vii) Which of the following is true about a hydrophilic signalling molecule?
(a) Its receptor is located in the cytosol of the target cell.
(b) It might trigger a signal cascade that causes some effect in the cell.
(c) Since it can enter the cell, it directly affects some specific cell process.
(d) It is a steroid.

- (viii) In the signal transduction mechanism known as protein phosphorylation:
(a) the signalling molecule binds to a surface receptor.
(b) Receptor kinases play a key role in triggering the signal cascade.
(c) Phosphorylated proteins act with enzymes to trigger the signal cascade.
(d) All of the above.
- (ix) Rubisco binds to:
(a) CO₂ (b) O₂ (c) both CO₂ and O₂ (d) none.
- (x) β-oxidation takes place in:
(a) Mitochondria (b) Cytoplasm
(c) Chloroplast (d) Nucleus

Group – B

2. (a) Discuss, with a flow-chart, the preparatory phase of glycolysis. Why is this called a preparatory phase?
(b) In the synthesis of glucose in liver, how does this phase operate?
(c) Write short notes on : Lock and key model for enzyme activity.
4 + 4 + 4 = 12
3. (a) What is oxidative phosphorylation? Write the sequence of electron carriers in the respiratory chain by a schematic diagram.
(b) State and explain chemiosmotic coupling hypothesis.
(c) Explain the molecular mechanism of the following:
(i) Barbiturate
(ii) 2,4-DNP

(1 + 4) + 3 + (2 + 2) = 12

Group – C

4. (a) What are the functions of carrier proteins for hormones?
(b) Outline the mechanism of action of hydrophilic hormones with receptors in target cells.
(c) Using a flow-chart, explain how negative feedback mechanism regulates hormone secretion.
4 + 4 + 4 = 12
5. (a) Discuss about Atherosclerosis.
(b) Describe with example the differences in β-oxidation of MUFA and PUFA.
(c) Describe what happens in presence of too much or too little of Vitamin K and E.

4 + 4 + (2 + 2) = 12

Group - D

6. (a) Mention catabolic pathway of phenylalanine. What defect in this pathway results in phenylketonuria?

(b) How is ammonia excreted in mammals?

$$(4 + 2) + 6 = 12$$

7. (a) Describe the breakdown of purines.

(b) Discuss the synthesis of: GABA and Dopamine.

$$6 + (3 + 3) = 12$$

Group - E

8. (a) What is the major difference between primary and secondary messengers?

(b) Describe the β -adrenergic pathway and how epinephrine is desensitized.

(c) Discuss about ligand gated ion channels.

$$4 + 4 + 4 = 12$$

9.(a) What is the effect of adding and removing phosphates?

(b) What are the different types of enzyme linked receptor?

(c) Describe in detail how RTK works.

$$4 + 4 + 4 = 12$$