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CS/B.Tech (BT-OLD)/SEM-3/BT-301/2012-13

2012
CELL BIOLOGY AND BIOCHEMISTRY

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) The net gain of ATP molecules resulting from Glycolysis is

a) 2 b) 4

c) 36 d) 38.

ii) Any phosphorylation reaction catalysed by Kinase requires

a) Mn^{+2} / Mg^{+2} b) Inorganic phosphate

c) Epinephrine d) All of these.

iii) The hexose monophosphate shunt has greater importance in cellular metabolism because it produces

a) NADH b) ATP

c) Acetyl CoA d) NADPH.

iv) The chemical substance that enters the Krebs' cycle for further metabolism is

a) Ethyl alcohol b) Pyruvic acid

c) Acetyl CoA d) Lactic acid.

v) Amino acid not involved in urea cycle is

a) Arginine b) Histidine

c) Citruline d) Aspartic acid.

vi) A key substance in pyrimidine biosynthesis is

a) Carbamoyl phosphate b) ATP

c) Thiouracil d) Ribose 5 phosphate.

vii) The most abundant lipid in a cell membrane is

a) Phospholipid b) Steroid

c) Cholesterol d) Cutin.

viii) Calmodulin is a

a) Fe^{++} binding protein b) Fe^{+++} binding protein

c) Ca^{++} binding protein d) None of these.

ix) Mono-unsaturated fatty acid is

a) Palmitic acid b) Stearic acid

c) Oleic acid d) both (a) & (b).

x) Enzyme responsible for rate limiting step of glycolysis is

a) Hexokinase b) Phosphofructokinase

c) Pyruvate kinase d) Aldolase.

xi) In aerobic oxidation, terminal electron acceptor in the electron transport chain is

a) NO_2 b) NO_3

c) H_2O d) O_2.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What do you mean by photosystem ? How many photosystems are present in plants ? What are the structural components and function of photosystem in plant ? 1 + 1 + 3

3. What is cori cycle ? Where does it occur ? Mention the significance of this cycle in human system. 2 + 1 + 2

4. Describe the ubiquitin mediated degradation of protein. 5

5. Discuss the steps in pentose phosphate pathway with overall reactions. 5

6. How is glycogen metabolism controlled by cAMP and insulin ? 5

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Describe different steps in glycolysis and net gain in ATP.

   b) Explain how pyruvate functions in aerobic and anaerobic metabolic pathways.

   c) Write the difference between glycogenesis and glycogenolysis. How are these two processes regulated by hormones and enzymes ? 6 + 3 + 6

8. a) What is oxidative phosphorylation ? Write the sequence of electron carriers in the respiratory chain.

   b) State and explain chemiosmotic coupling hypothesis.

   c) Name two inhibitors of electron transport chain and show where they are acting. 2 + 5 + 4 + 4

9. a) What are the light and dark reactions of photosynthesis ?

   b) Where do they take place in the chloroplast ?

   c) Draw a neat diagram of the chloroplast. 4 + 4 + 2 + 5

10. a) What is carnitine ? Discuss its role in fatty acid metabolism.

    b) What is β-oxidation ? How many ATP will be produced from palmitic acid by this process ?

    c) What are ketone bodies ? When and how are they formed ? 5 + 5 + 5