

(2½ Hours)

[Total Marks :75

- N.B. : (1) All questions are compulsory.
 (2) Internal choices have been given.
 (3) Figures to the right indicate full marks.

1. (A) Fill in the blanks(any three):-

- (i) Glycolysis in the anaerobic conditions leads to _____ production.
 (a) Pyruvate (b) Lactate (c) Malate
- (ii) HMP shunt occurs in the _____
 (a) Cytosol (b) Mitochondria (c) Golgi complex
- (iii) _____ is considered to play a catalytic role in citric acid cycle.
 (a) Succinic acid (b) α -Ketoglutarate (c) Oxaloacetate
- (iv) Gluconeogenesis is regulated by _____
 (a) Glucagon (b) Lactate (c) Both 'a' and 'b'
- (v) Glycogen phosphorylase is a key enzyme in _____
 (a) Gluconeogenesis (b) Glycogenesis (c) Glycogenolysis
- (vi) Pyruvate is converted to acetyl CoA by _____
 (a) Oxidative decarboxylation (b) Reductive decarboxylation (c) Both 'a' and 'b'

(B) Define and explain(any one):-

- (i) Gluconeogenesis
 (ii) Glycogenesis

(C) Write short notes on (any one):-

- (i) Glyoxylate pathway
 (ii) Oxidation of pyruvate to acetyl CoA

(D) Elaborate on (any one):-

- (i) TCA with reactions
 (ii) HMP shunt with reactions

2. (A) Fill in the blanks(any three):-

- (i) The NADH shuttle used by skeletal muscles and brain is _____
 (a) Malate-Aspartate shuttle
 (b) Glycerol phosphate shuttle
 (c) Both 'a' and 'b'
- (ii) _____ explains the dependence of electron transfer on ATP synthesis in mitochondria.
 (a) Proton-motive force
 (b) Rotational catalysis
 (c) Chemiosmotic theory

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- (iii) Q cycle results in the passage of electrons through _____ in ETC.
- Complex IV
 - Complex III
 - Complex V
- (iv) Iron-sulphur proteins are characteristic of the _____ cycle.
- ETC
 - EMP
 - Both 'a' and 'b'
- (v) _____ inhibits cytochrome oxidase.
- Cyanide
 - Rotenone
 - Amytal
- (vi) Photosystem II contains a reaction centre chlorophyll called _____
- P700
 - P680
 - P600

(B) Define and explain (any one):-

- Free energy
- Photophosphorylation

(C) Discuss in detail (any one):-

- Malate-Aspartate shuttle
- Dark reaction and light reaction of photosynthesis

(D) Elaborate on (any one):-

- Z scheme of photosynthesis
- Structure of ATP synthase

3. (A) Fill in the blanks (any three):-

- The stationary phase in reverse phase partition chromatography is _____ supported by a matrix.

- Non-polar compound
- Polar compound
- Water

(ii) $V_e = v_o + \text{_____} \times V_i$

- Rf
- Kd
- aWr

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- (iii) In GLC, a stationary phase of silicon grease is supported on _____.
- Celite
 - Sephadex
 - Resin
- (iv) In the detection of component, _____ is useful if unsaturated compounds are being investigated.
- Iodine vapour
 - Ninhydrin
 - H₂SO₄ in ethanol
- (v) In TLC, for charged lipids, _____ solvents are used.
- Polar
 - Non-polar
 - Both 'a' and 'b'
- (vi) If K_d is _____, moderately moving zones are obtained.
- Greater than 1
 - 1
 - Less than 1

(B) Define and explain (any one):-

- Stationary phase
- Ion exchangers

(C) Write short notes on (any one):-

- Principle of HPLC
- Application of gel filtration chromatography

(D) Elaborate on (any one):-

- Adsorption chromatography
- Paper chromatography

4. (A) Fill in the blanks (any three):-

- The active form of vitamin D in humans is _____.
 - Ergocalciferol
 - Cholecalciferol
 - Dehydrocholesterol
- Riboflavin consists of sugar alcohol attached to _____.
 - Flavin
 - Chromane
 - Pyridine
- pI value of lysine is _____.
 - 5.97
 - 2.34
 - 9.74

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- (iv) The isoelectric pH of glycine is calculated by arithmetic mean of pK_1 and _____
- pK_2
 - pK_3
 - pK_R

- (v) _____ takes part as coenzyme in transamination.

- Pyridoxine
- Flavin
- Biotin

- (vi) In titration curve, the relatively flat zone observed is called _____

- Titration zone
- Acceptor zone
- Buffering zone

- (B) Define and Explain the following (any one):-

- Vitamins
- FAD

- (C) Write short notes on (any one):-

- Role of vitamin A in vision
- Coenzyme form of vitamin B1

- (D) Discuss in detail (any one):-

- Working of glass electrode and its applications
- Titration curve of aspartate

5. (A) Justify any one of the following:-

- Citric acid cycle is amphibolic
- Glycolysis in humans is highly significant.

- (B) Elaborate on (any one):-

- Uncouplers of ETC
- Electron carriers in photosynthesis

- (C) Explain any one of the following:-

- Application of ion exchange chromatography
- Principle of affinity chromatography

- (D) Attempt any one of the following:-

- Physiological role of vitamin E
- Calculate the pH of a mixture of 0.1M acetic acid and 0.2M sodium acetate ($pK_a = 4.76$).

- (E) Write True or False (any three):-

- Glyceraldehyde-3-phosphate is formed at the end of phase I of glycolysis.
- Transketolases form part of gluconeogenesis.
- Ubiquinone is also known as CoQ10.
- Affinity chromatography relies on differences in the physical properties of the molecules to be separation of buffers.
- Henderson-Hasselbalch equation is used for preparation of buffers.
- Riboflavin and Lactoflavin are different biomolecules.