

(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)  $\alpha$ -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.  
 (a) Complex IV  
 (b) Complex III  
 (c) Complex V
- (iv) Iron-sulphur proteins are characteristic of the \_\_\_\_\_ cycle.  
 (a) ETC  
 (b) EMP  
 (c) Both 'a' and 'b'
- (v) \_\_\_\_\_ inhibits cytochrome oxidase.  
 (a) Cyanide  
 (b) Rotenone  
 (c) Amytal
- (vi) Photosystem II contains a reaction centre chlorophyll called \_\_\_\_\_.  
 (a) P700  
 (b) P680  
 (c) P600

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

- (i) Free energy  
 (ii) Photophosphorylation

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

- (i) Malate-Aspartate shuttle  
 (ii) Dark reaction and light reaction of photosynthesis

(D) Elaborate on (any one):-

- (i) Z scheme of photosynthesis  
 (ii) Structure of ATP synthase

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

- (i) The stationary phase in reverse phase partition chromatography is \_\_\_\_\_ supported by a matrix.  
 (a) Non-polar compound  
 (b) Polar compound  
 (c) Water
- (ii)  $V_e = v_o + \text{_____} \times V_i$   
 (a)  $R_f$   
 (b)  $K_d$   
 (c)  $aW_r$

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- (iii) In GLC, a stationary phase of silicon grease is supported on\_\_\_\_\_.  
 (a) Celite  
 (b) Sephadex  
 (c) Resin
- (iv) In the detection of component,\_\_\_\_\_ is useful if unsaturated compounds are being investigated.  
 (a) Iodine vapour  
 (b) Ninhydrin  
 (c)  $H_2SO_4$  in ethanol
- (v) In TLC, for charged lipids,\_\_\_\_\_solvents are used.  
 (a) Polar  
 (b) Non-polar  
 (c) Both 'a' and 'b'
- (vi) If  $K_d$  is\_\_\_\_\_, moderately moving zones are obtained.  
 (a) Greater than 1  
 (b) 1  
 (c) Less than 1

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

- (i) Stationary phase  
 (ii) Ion exchangers

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

- (i) Principle of HPLC  
 (ii) Application of gel filtration chromatography

(D) Elaborate on (any one):-

- (i) Adsorption chromatography  
 (ii) Paper chromatography

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

- (i) The active form of vitamin D in humans is\_\_\_\_\_.  
 (a) Ergocalciferol  
 (b) Cholecalciferol  
 (c) Dehydrocholesterol
- (ii) Riboflavin consists of sugar alcohol attached to\_\_\_\_\_.  
 (a) Flavin  
 (b) Chromane  
 (c) Pyridine
- (iii) pI value of lysine is\_\_\_\_\_.  
 (a) 5.97  
 (b) 2.34  
 (c) 9.74

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(iv) The isoelectric pH of glycine is calculated by arithmetic mean of  $pK_1$  and \_\_\_\_\_

- (a)  $pK_2$
- (b)  $pK_3$
- (c)  $pK_R$

(v) \_\_\_\_\_ takes part as coenzyme in transamination.

- (a) Pyridoxine
- (b) Flavin
- (c) Biotin

(vi) In titration curve, the relatively flat zone observed is called \_\_\_\_\_

- (a) Titration zone
- (b) Acceptor zone
- (c) Buffering zone

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

- (i) Vitamins
- (ii) FAD

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

- (i) Role of vitamin A in vision
- (ii) Coenzyme form of vitamin B1

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

- (i) Working of glass electrode and its applications
- (ii) Titration curve of aspartate

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

- (i) Citric acid cycle is amphibolic
- (ii) Glycolysis in humans is highly significant.

(B) Elaborate on (any one):-

- (i) Uncouplers of ETC
- (ii) Electron carriers in photosynthesis

(C) Explain any one of the following:-

- (i) Application of ion exchange chromatography
- (ii) Principle of affinity chromatography

(D) Attempt any one of the following:-

- (i) Physiological role of vitamin E
- (ii) 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):-

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