

(3 hours)

Total marks:100

**Instructions to the candidates, if any:-**

- 1) All the questions are compulsory. Choice is internal.
- 2) Figures to the right indicate full marks.
- 3) All questions carry equal marks.
- 4) Draw flowcharts /diagrams wherever necessary.

- Q1B) Fill in the blanks: (**any three**) **3**
- i) \_\_\_\_\_ is an enzyme requiring ATP as substrate
  - ii) The starting material for TCA is \_\_\_\_\_.
  - iii) Glycogen is a polymer of \_\_\_\_\_
  - iv) \_\_\_\_\_ is a pentulose
- Q1B) Define and explain **any one** **3**
- i) Glycogenesis
  - ii) Catabolism
- Q1C) Attempt **any one**: **6**
- i) Schematically represent TCA
  - ii) Write a note on Pyruvate Dehydrogenase Enzyme complex.
- Q1D) Attempt **any one** : **8**
- i) Write notes on a) Glycogenolysis and (b) Glyoxylate cycle
  - ii) If C3 and C4 of Glucose are labelled with C-14, trace the fate of C-14 in Glycolytic pathway
- Q2A) Fill in the blanks: (**Any three**) **3**
- i) Dark reaction takes place in \_\_\_\_\_
  - ii) The initial electron donor of the ETC is \_\_\_\_\_, which gives its two electrons off to FMN, within Complex II.
  - iii) The key enzyme that accomplishes the fixing of carbon is \_\_\_\_\_.
  - iv) Most abundant enzyme on earth is \_\_\_\_\_.
- Q2B) Attempt **any one**: **3**
- i) Explain (a) where (b) how cyanide stops ATP production in the mitochondria.
  - ii) How has Hill contributed to our understanding of photosynthesis.
- Q2C) In detail answer **any one**: **6**
- i) What is the significance of Malate-Aspartate Shuttle? With the help of a representation explain the same.
  - ii) Explain by means of a diagram the process of ATP formation by oxidative phosphorylation.

- Q2D) Answer **any one** in detail: 8
- i) Schematically represent the Z scheme with all the electron carriers involved.
  - ii) Discuss the electron chain carriers in ETC
- Q3A) Fill in the blanks: (**any three**) 3
- i) Calcium carbonate can be used for \_\_\_\_\_ chromatography.
  - ii) Distribution coefficient cannot have a value \_\_\_\_\_
  - iii) \_\_\_\_\_ can be a mobile phase in GC
  - iv) Antibodies can be separated by \_\_\_\_\_ chromatography
- Q3B) Define and explain **any one** 3
- i) Rf
  - ii) Gradient elution
- Q3C) Write a detailed answer for **any one**: 6
- i) Describe a technique to separate glucose, lactose and xylose
  - ii) Discuss the principle and applications of Ion exchange chromatography
- Q3D) Attempt **any one** : 8
- i) Elaborate on Gel Chromatography
  - ii) Write notes on a) TLC and (b) Column Chromatography
- Q4A) **Fill in the blanks: (Any three)** 3
- i) The pH of a carbonated drink is \_\_\_\_\_.
  - ii) A solution with pH 2 is \_\_\_\_\_ acidic compared to a solution of pH 4
  - iii) Biotin is a coenzyme for \_\_\_\_\_ reactions.
  - iv) The coenzyme form of thiamine is \_\_\_\_\_
- Q4B) **Attempt any one:** 3
- i) Mention the (a) coenzyme form and (b) biochemical role of riboflavin.
  - ii) Justify: 'pH meter works on the principle of ion exchange'
- Q4C) **Answer any one in detail:** 6
- i) What is the visual cycle? What is the role of Vitamin A in the visual cycle?
  - ii) Derive the Henderson Hasselbalch equation.
- Q4D) **Answer any one in detail:** 8
- i) With the help of a graph, explain the titration curve of an acidic amino acid. Mention the pKa values and the pI value as well. What is the relevance of titration curve to human physiology?
  - ii) Justify the statement: 'Vitamin D metabolism is both regulated by and regulates calcium homeostasis'

Q5 A) Answer in brief any four of the following: 16

i) Explain giving suitable examples anapleurotic reactions

**OR**

i) Discuss the reactions of Gluconeogenesis

ii) Discuss the significance of Calvin cycle.

**OR**

ii) Write an elaborate note on Chemiosmotic hypothesis.

iii) Give the principles of Affinity chromatography and HPLC

**OR**

iii) Write briefly on the different types of paper chromatography

iv) Write a detailed note on vitamin K

**OR**

iv) Define: Titration curve. Draw the titration curve of glycine, with special mention of pKa values and pI.

Q5B) State TRUE or FALSE: (any four) 4

i) Rotenone inhibits complex II.

ii) Lysine has four ionizable groups

iii) Ninhydrin is the detecting agent for visualising sugar separation through paper chromatography

iv) Fat soluble vitamins include Riboflavin

v) TCA is also called EMP

vi) Catabolism involves expenditure of ATP