

(3Hours)

(100 Marks)

**Instructions to the candidates:**

- (i) All questions are compulsory. Choice is internal
- (ii) Figures to the right indicate full marks.
- (iii) Draw structures and diagrams wherever necessary.
- (iv) Draw flowcharts / diagrams wherever necessary.

**Q1 A) Match the following:**

(04)

i) Lyases	a) Iodoacetate
ii) Cofactor	b) catalyze redox reactions
iii) Glucokinase	c) $\text{FADH}_2$
iv) Irreversible inhibitor	d) remove a group from or add a group to double bonds
	e) Iron in haem
	f) Substrate specific

**Q1 B) Answer the following: (any three)**

(09)

- (i) Briefly explain Koshland's hypothesis.
- (ii) State **True or False**, giving detailed reasons: "Enzymes are consumed during metabolic reactions"
- (iii) Citing examples, explain how pH affects enzyme activity.
- (iv) Differentiate between cofactors, coenzymes and prosthetic group.
- (v) Discuss the advantages of the LB plot.
- (vi) Mention the units of measuring enzyme activity.

**Q1 C) Answer the following in detail: (any two)**

(12)

- (i) Both enzymes and catalysts hasten the rate of reaction, however there exists dissimilarities between them. Explain the same
- ii) Write a note on competitive inhibition of enzymes, with suitable examples.
- iii) Given an enzyme with a  $K_m = 10 \text{ mM}$  and  $V_{\max} = 100 \text{ mmol/min}$ . Calculate  $V_o$ , if  $[S] = 100 \text{ mM}$ . Which will increase the velocity more: a 10-fold decrease in  $K_m$ , or a 10-fold increase in  $V_{\max}$ ?
- iv) Elaborate on the EC classification of enzymes.

**Q2 A) State True or False:**

(04)

- (i) IAA is produced in actively growing fruits.
- (ii) Hormones are secreted by ductless glands.
- (iii) Progesterone is secreted by corpus luteum
- (iv) Epinephrine binds to intracellular receptor.

**Q2 B) Answer the following: (any three)**

(09)

- (i) Briefly explain the different types of hormonal receptors.
- (ii) Discuss the physiological significance of FSH.
- (iii) State **true or false** giving detailed reasons- Fast acting hormone generally alter gene expression.
- (iv) Mention any three functions attributed to cytokinins.
- (v) Describe how apical dominance is an important effect of auxin.
- (vi) With a suitable example, explain the significance of secondary messenger.

**Q2 C) Write informative notes on: (Any two)**

(12)

- i) Physiological role of thyroxine
- ii) Ethylene as a phytohormone

- iii) Hierarchical organization of mammalian endocrine system
- iv) Vasopressin

**Q3 A) State True or False:****(04)**

- (i) Buffers are mixtures of strong acid and weak base.
- (ii) The flat zone in a titration curve is the transition zone.
- (iii) Phosphate buffer is the major intracellular buffer.
- (iv) The equilibrium constant of water is  $1.8 \times 10^{-16} \text{M}$

**Q3 B) Attempt: (any three)****(09)**

- (i) What is the pH of a mixture of 0.062 M  $\text{NaH}_2\text{PO}_4$  and 0.088 M  $\text{Na}_2\text{HPO}_4$ ? ( $\text{pK}_a = 6.8$ )
- (ii) Define: Buffer;  $K_w$  and  $\text{pH}_m$ .
- (iii) Draw structures of the predominant ionization states of Glycine.
- (iv) With the help of structure explain zwitterion. In which direction will it move when subjected to an electric field?
- (v) Citing example of acetate buffer, explain buffering capacity.
- (vi) Calculate the concentration of hydrogen ion, if the pH of the solution is 4.6?

**Q3 C) Answer the following in detail: (any two)****(12)**

- (i) Explain the role of hemoglobin as blood buffer.
- (ii) Derive the relationship between pH and  $\text{pK}_a$  of a weak acid. Also, explain its significance.
- (iii) With ionization forms and  $\text{pK}_a$  values, explain the titration curve of an acidic amino acid with a standard alkali.
- (iv) Justify: "The value of neutral pH as 7 is not an arbitrarily chosen value." Also, calculate the  $\text{OH}^-$  concentration in a neutral solution, if the value of  $K_w$  is  $5 \times 10^{-20} \text{M}$ .

**Q4 A) Define the following: (any five)****(10)**

- (i) Isoelectric pH      (ii) Equilibrium constant      (iii) Endocrinology      (iv) Phytohormone
- (v) Active site      (vi) Irreversible inhibitor      (vii) Holoenzyme

**Q4 B) Answer the following: (any three)****(15)**

- (i) Justify: "Bicarbonate buffer system is the most important extracellular buffer".
- (ii) Explain Sorenson formal titration and state its significance.
- (iii) Compare and contrast: Auxins and Gibberellins.
- (iv) Explain the sequence of events that takes place when epinephrine binds to its receptor.
- (v) Discuss the various factors affecting enzyme activity.
- (vi) What is  $K_m$  of an enzyme? How will the  $K_m$  of succinate dehydrogenase be affected at: (a)  $[\text{S}] = \infty$       (b)  $V_o = V_{\text{max}}/2$       (c) In presence of Malonate.