2024

BOTANY — HONOURS

Paper : CC-12

(Biochemistry)

Full Marks : 50

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer briefly ***any five*** of the following : 2×5

   (a) Write down the Handerson-Hasselbalch equation.

   (b) Which of the following pair of sugars consist of epimers?

   (i) α-D-glucose and β-D-glucose

   (ii) D-glucose and D-galactose.

   (c) Write down the structure of ATP.

   (d) Explain how a fatty acid and glycerol molecule combine to form a lipid molecule.

   (e) Write the differences between inorganic and organic buffer.

   (f) Write briefly the differences between α helix and β sheet structure of protein.

   (g) What is redox potential? Give an example.

2. Answer ***any two*** of the following :

   (a) What are the principles of thermodynamics? What is Gibb's free energy? 3+2

   (b) Write down the name and structure of a homopolysaccharide. What do you mean by heteropolysaccharide? Give an example. 3+2

   (c) Write briefly competitive and non-competitive inhibition of enzyme activity. Give examples. 5

   (d) Classify amino acids on the basis of their side chains (R group). 5

3. Answer ***any three*** questions :

   (a) Write a short note on organeller DNA. Which RNA is also known as cytoplasmic RNA? Write briefly about the clover leaf model of tRNA. 4+1+5

   (b) What is membrane potential? How the electrochemical potential gradient is altered in chloroplast during photophosphorylation? Write two differences between primary and secondary active transport mechanism of ions. Give the examples of an antiporter and symporter involved in oxidative phosphorylation. 2+4+2+2

(c) (i) Classify enzymes according to IUBMB at the level of classes with one example from each class.

(ii) Urease enzyme hydrolysed urea at $[S] = 0.03$ m mol/L with a K_m value of 0.06 m mol/L. The initial velocity observed was 1.5×10^{-3} m mol/L/min. Calculate the maximum velocity of the enzyme reaction. 5+5

(d) How are water's material properties encoded within the structure of water molecule? State the properties of water. Mention the importance of Hydrogen bonds in life processes. 2+5+3

(e) State the differences between a simple lipid and a compound lipid. Discuss the structure and functions of phospholipids. 'A phospholipid is amphipathic.' — Explain. 2+6+2