SET A

[This question paper contains 2 printed pages]

Sr. No. of Question paper **Roll No……**

Name of the Course : B.Sc. (H) Chemistry

Semester : V

Name of the Paper : Chemistry C-XI

Organic Chemistry IV: Biomolecules

Unique Paper Code : 32171501

Duration : 3 Hours

Maximum Marks : 75 Marks

Instructions for students-

1. Attempt the paper on plain white sheets only.
2. Each sheet is to be numbered and signed at the top.
3. Answer four questions in all.
4. All questions carry equal marks.

Q.1 (a) Define isoelectric point and give its significance in protein chemistry. Calculate the isoelectric point of glutamic acid from the following data

pka_1=2.19, pka_2= 4.25 and pka_3 = 9.67

(b) What do you mean by stereochemical and kinetic specificity of an enzyme. Explain with an example of each.

(c) Write down the structure of triolein. Give its chemical name and calculate its iodine number. (6.25,6.25, 6.25)

Q.2 (a) Angiotensin I (A) is a decapeptide which on complete hydrolysis with 6N-HCl showed the presence of the following amino acid residues:

Arg, Val, Tyr, 2His, Phe, Leu, Asp, Ile and Pro

On treatment with carboxypeptidase enzyme, Leu is obtained first. Treatment with DNFB followed by hydrolysis gave DNP derivative of Asp. Enzymatic hydrolysis with chymotrypsin yielded the following shorter peptides

(i) Val, Asp, Arg, Tyr
(ii) Pro, His, Phe, Ile
(iii) Leu, His

Partial hydrolysis of (i) gave following smaller peptides

(iv) Arg, Asp
(v) Tyr, Val

Edman degradation of peptide (ii) gave first Ile and then His.

Give the complete sequence of amino acids in the decapeptide and explain the reactions involved.

(b) (i) Give the synthesis of tryptophan by Erlenmeyer Azalactone method.

(ii) Name the heterocyclic base which is present in DNA molecule and not in RNA. Give its synthesis.

(12.5, 6.25)

Q.3 (a) Write down two irreversible steps of citric acid cycle with the structures and enzymes involved.

(b) What are broad spectrum and narrow spectrum antibiotics? Give an example of each. Write synthesis of one broad spectrum antibiotic.

(c) What is Chargaff's rule. Discuss its significance.

(6.25, 6.25, 6.25)

Q.4 (a) What are omega fatty acids. Discuss their importance in our diet by taking any two examples.

(b) Give the structure and IUPAC name of Ibuprofen and write its conventional synthesis.

(c) (i) Discuss the forces responsible for tertiary structure of proteins.

(ii) Explain catabolic and anabolic pathways.

(6.25, 6.25, 6.25)

Q.5 (a) Synthesize alanylphenylalanylglycine by Merrifield solid phase synthesis. Discuss advantages of solid phase synthesis.

(b) Give the structure of NAD^+ and discuss its role in biochemical reactions by giving a suitable example.

(c) How will you differentiate between RNA and DNA by alkaline hydrolysis. Give mechanism of the reaction involved.

(6.25, 6.25,6.25)

Q.6 Write short notes on the following (attempt any three)

(a) Denaturation of Proteins
(b) Vitamin C
(c) Anaerobic oxidation
(d) Factors affecting the enzyme activity

(6.25, 6.25, 6.25)