

Unique Paper Code : 32171501

Name of Paper : Organic Chemistry IV: Biomolecules

Name of the course : B.Sc. (Hons.)

Semester : V

Duration : 3 hours

Maximum Marks : 75 Marks

Instructions for Candidates

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

Q.1 (a) A carbohydrate (**P**) having the molecular formula ($C_{12}H_{22}O_{11}$) is hydrolyzed with *emulsin*, only D-glucose is obtained. **P** reacts with Br_2 water as well as Benedict reagent. Also, when **P** is subjected to following sequence of reactions, **Q** and **R** are produced. Deduce the structure of **P** and also explain the reactions.



2,3,4,6-tetra-*O*-methyl-D-glucose (**Q**) + 2,3,5,6-tetra-*O*-methyl-D-gluconic acid (**R**)

(b) Which form of alanine would you expect to predominate in (i) strongly acidic solution (ii) strongly basic solution and (iii) at its isoelectric point. Indicate which part of the dipolar ion behaves as a potential acid or potential base and also find out the isoelectric point of alanine ($pK_{a1} = 2.3$, $pK_{a2} = 9.7$).

(c) (i) What is the difference between nucleosides and nucleotides? Give the structure of guanosine-5'-triphosphate.

(ii) Give one example of each, ω -3 and ω -6 fatty acids with their structures.

(6.75, 6, 6)

Q.2 (a) Write the Merrifield synthesis of the dipeptide Gly-Val. What are the advantages of this method over other methods?

(b) Rate of glucose mutarotation is slow in D_2O than in H_2O . Explain with mechanism.

(c) How many types of RNA are known which works collectively for the protein synthesis? Explain their roles in brief.

(6.75, 6, 6)

Q.3 (a) What is fermentation? Write down the fate of pyruvate in alcoholic and lactate fermentation with enzymes involved.

(b) Define saponification value and give its significance. Calculate the saponification value of glyceryl tripalmitate having Mol. Wt. 806 (Mol. Wt. of KOH = 56).

(c) Explain the process of Replication of DNA.

(6.75, 6, 6)

Q.4 (a) (i) Write down the role and importance of enzyme *phosphofructokinase* in glycolysis.
(ii) Give the structure of NAD^+ .

(b) Give the synthesis of Proline by phthalimide malonic ester method.

(c) Explain Dansyl Chloride method of *N*-terminal analysis. What is the advantage of this method over other methods of *N*-terminal analysis?

(6.75, 6, 6)

Q.5 (a) What is enzyme inhibition? Explain allosteric inhibition.

(b) Using Haworth projection draw the structures of the following:

(i) α -D-Glucopyranosyl- β -D-fructofuranoside

(ii) 4-*O*-(β -D-Galactopyranosyl)- α -D-glucopyranose

(c) Write down three irreversible steps in the glycolysis process. Write all the structures and name of enzymes involved.

(6.75, 6, 6)

Q.6 Write short notes on any three of the following:-

(a) Genetic Code

(b) Starch and Cellulose

(c) Reversion and Rancidity

(d) Secondary Structure of Proteins

(6.25, 6.25, 6.25)