FYUGP/Sem-6/CH-CE1

2026

Chemistry (Core)

Paper Code : CH-CE-6314

Paper Name : Organic Chemistry - III

Time : 2 hours ***Full Marks : 50***

The figures in the margin indicate full marks for the questions.

1. Answer the following questions : 1×4=4
   a) What class of alkaloid does nicotine belong to ?
   b) Why do amino acids have high melting points compared to non-polar organic compounds ?
   c) What is Rancidity ?
   d) Which of the following nitrogenous base is 6-aminopurine ?
      i) Guanine
      ii) Uracil
      iii) Thymine
      iv) Adenine (Choose the correct option)
2. Answer the following questions : 2×3=6
   a) Between saturated and unsaturated naturally occuring fatty acids, which one has higher melting point and why ? 1+1=2
   b) Which chemical test is used for the detection of α-amino acids in their ionic forms ? 2
   c) How will you confirm that citral contains an aldehydic group? 2
3. Answer the following questions ***(any two)*** : 5×2=10

a) i) What is isoprene rule ? Apply isoprene rule to citral molecule to show the attachment of isoprene units. 1+1=2

ii) Propose a synthetic procedure of citral from 6-methylhept-5-

Contd..

en-2-one. 3

b) i) Name three pyrimidine heterocycles present in nucleic acids. Draw their structures. 3

ii) Write a general method of syntheisis of pyrimidine derivarive. 2

c) i) Write down the steps for the synthesis of a tripeptide Gly-Ala-Phe in the solid phase with the help of Merrifield resin. 3

ii) What happens when alanine is heated with acetic anhydride in pyridine solvent ? Give the chemical reaction. 2

d) i) How will you distinguish chemically between D-glucose and D-fructose ? 2

ii) An aldopentose 'A' can be oxidized to an optically active aldaric acis 'B'. Degradation of 'A' gives 'C'. Oxidation of 'C' produces an optically inactive aldaric acid 'D'. 'A' belongs to 'D' family. Give the structure of 'A', 'B', 'C' and 'D' with reasons. 3

4. Answer the following questions ***(any three)*** : 10×3=30

a) i) Draw the structure of nicotine and identify the chiral carbon. 1

ii) Write on medicinal importance of morphine along with side effects. 1

iii) How are methoxyl groups in alkaloids determined ? 2

iv) How will you establish the presence of pyridine nucleus in nicotine. 3

v) Write how alkaloids can be extracted from plants. 3

b) i) Draw the Haworth Projection of D-glucose. 1

ii) Convert D-glucose to gluconic acid. 2

iii) Describe the mutarotation of glucose. 2

iv) What are the expected products of hydrolysis of Sucrose. 2

v) What is anomeric effect ? How does it vary with solvent

polarity? 1+2=3

c) i) Write the pyranose structure of D-glucose. 1

ii) What are epimers ? 1

iii) What is meant by reducing sugar ? Give an example of it. 1+1=2

iv) What happens when D-glucose is subjected to HNO_3 oxidation? 2

v) Fructose contains a keto group, but still it gives silver mirror test on treatment with Tollen's reagent. Explain by showing the reactions involved. 4

d) i) Which pair between A-T and G-C, hydrogen bonding is stronger ? Why ? 1+1=2

ii) Describe how the sequence of peptide is determined. 3

iii) Define Saponification number and Iodine number. In what way these have proved useful in the analysis of oils and fats. 3+2=5

e) i) Why amino acids behave like salts rather than simple amines or carboxylic acids ? 1

ii) Give one example of biologically important peptide and write its functions. 2

iii) What happens to the zwitterionic from of glycine when it is heated ? 2

iv) Differentiate between nucleoside and nucleotides. 2

v) Describe the structure of starch. 3

f) i) Which carbon atom of the purine ring combines with the sugar molecule during nucleotide formation ? 1

ii) Why α-amino acids (except glycine) are optically active ? 1

iii) Explain briefly the factors responsible for the stabilization of a DNA double helix. 2

iv) Name the two important precurors in the biosynthesis of terpenes with their structures. 1½×2=3

v) What happens when an α-amino acid is allowed to react with formaldehyde ? What is the significance of this reaction ? 2+1=3

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