RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SIXTH SEMESTER EXAMINATION, JUNE 2022

THIRD YEAR (BATCH 2019-22)

Date : 17/06/2022 **CHEMISTRY (HONOURS)**

Time : 11.00 am – 1.00 pm **Paper : DSE-3** Full Marks : 50

Attempt **any five** questions :

1. a) E, F and G are the three aldohexoses. E and F yield D-sorbitol when they are Catalytically hydrogenated. E and F yield different osazones when treated with excess phenylydrazine. F and G give the same ozazone but different alditols. Give the structures of E, F and G assuming that F and G are D-aldohexoses. [3]

   b) Predict the products (A) to (C) in the following reactions. [3]

   i) Methyl α-D-glucofuranoside $\xrightarrow[\text{2-equivalent}]{HIO_4}$ (A) $\xrightarrow[H^+]{H_2O}$ (B)

   ii) Methyl α-D-glucopyranoside $\xrightarrow[H+]{PhCHO}$ (C)

   c) Convert : α-D-glucopyranose→ α-3-Deoxy-D-glucopyranose [2]

   d) Utilising the structural illustration, explain the non-reducing property of sucrose. [2]

2. a) Give the mechanism of osazone formation from D-glucose. Cite one evidence in favour of the mechanism. why osazone formation is stopped at the second carbon? Justify your answer. [3]

   b) Predict the products of the following reactions and explain their formation. [2×2]

   i) D-Arabinose $\xrightarrow[\text{high pH}]{HCN}$

   ii) α-D-glucopyranose $\xrightarrow[\text{2) Ph}\diagup\!\diagdown\text{ cl | base}]{\text{1) } Me_2CO/H^+}$

   c) The concept of 'end group interchange' was used by Fischer to distinguish the configurational structure of D-glucose and D-mannose. Explain. [2]

   d) Write the different interactions responsible for stabilising the secondary structure of a protein. [1]

3. a) Justify or Criticise : [2×3]

   i) $4c_1$ conformation of D-glucose is more stable than its Ic_4 conformation whereas Ic_4 conformation of L-galactose is more stable than its $4c_1$ conformation.

   ii) Formation of D-mannononitrile from D-arabinose is a thermodynamically controlled reaction.

   iii) Mutarotation of D-glucose is a case of first order asymmetric transformation which is not true for mutarotation of D-gluconolactone.

   b) Population distribution of α-and β-anomer of D-glucose and D-mannose is as follows : [4]

	α-anomer	β-anomer	Medium
D-glucose	36%	64%	H_2O
D-mannose	69%	31%	H_2O

   Explain this observation.

4. a) How is N-terminal amino acid determined by Edman's method? [2]

b) Describe the denaturation of protein by

i) changing pH, ii) heavy metal(Pb^{+2}) addition. [2]

c) Discuss the role of CNBr in peptide sequence analysis. [2]

d) Denaturation of protein cannot disrupt the primary structure of a protein. [True/False] [1]

e) Distinguish Lys.gly and gly.Lys. [2]

f) How would you explain the reducing property of D-fructose? [1]

5. a) What is post-translation modification? [2]

b) Write down the biological role for [3×2]

(i) RNA polymerase.

(ii) mRNA

(iii) tRNA

c) Write down the schmatic diagram for DNA $\rightarrow$ protein synthesis. [2]

6. a) What are Nucleosides and Nucleotides? Give example of each. [2]

b) Draw the hydrogen bonding present in DNA shown in Watson-crick model. [3]

c) Draw the structure of purine and pyrimidine bases that are present in RNA. [2]

d) i) Write down the process of DNA replication in schematic diagram. [2]

ii) Why DNA is called Genetic code of the life. [1]

7. a) Write down the class, structure and the medical importance or biological effect of the following alkaloids : [3]

(i) Nicotine

(ii) Cocaine

(iii) ephedrine

b) i) What is the monomeric unit for Terpenes? [1]

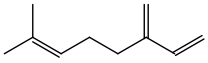
ii) Explain the isoprene rule with example. [2]

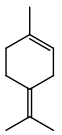
c) Give industrial preparation of Citral. [2]

d) What are terpinoids? Give one example. [2]

8. a) What are sesquiterpenes and diterpenes. Give one example of each. [4]

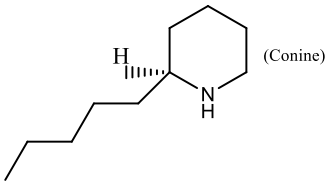
b) Find out the head-tail connection in the following terpenes :- [2]

(i) 

(ii) 

c) Give Schematic presentation for isolation of alkaloids from nature. [2]

d) The following molecule conine is found in hemlock poison. What class/type of alkaloids in this : [1]



(Conine)

e) Give one example and biological effect of indole type alkaloids. [1]

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