

[Time: 3 Hours]

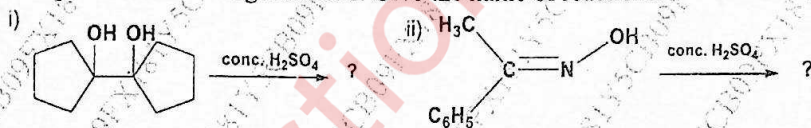
[Marks: 100]

- All questions are compulsory.
- All questions carry equal marks.
- Figures to the right indicate full marks.
- Use of log table/ non-programmable calculator is allowed.

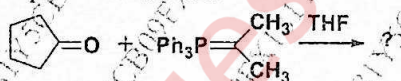
- Q.1 Attempt any four of the following.** 20
- A) Explain with mechanism the addition of bromine to but-2-ene is both stereospecific and stereoselective reaction? 5
- B) A chiral alcohol reacts with thionyl chloride. Write the reaction and its mechanism. Explain the stereochemistry involved in it. 5
- C) Explain the stereochemistry of KMnO_4 oxidation of maleic acid and fumaric acid. 5
- D) Define Topicity. Explain the following with one example: 5
- Enantiotopic ligands
 - Diastereotopic ligands
- E) a) Explain isoelectric point with respect to α -amino acids. 3
- b) Give preparation of alanine by Strecker synthesis. 2
- F) Explain in detail the preparation of a tripeptide by using the Merrifield solid phase peptide synthesis? 5

- Q.2 Attempt any four of the following.** 20

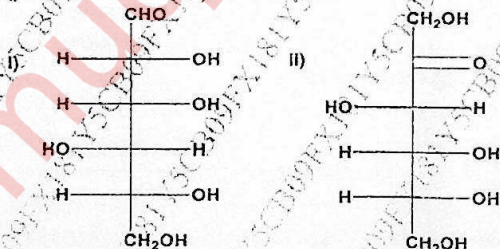
- A) What is Favorskii rearrangement? Explain with suitable example. 5
- B) a) Complete the following reactions. Give the name of reactions. 3



- b) Complete the reaction. 2



- C) a) Explain reducing and non-reducing sugars with suitable examples. 3
- b) Write appropriate reactions for acetylation of α -D-glucopyranose. 2
- D) Convert the following Fischer projection formula to Haworth formulae. (β -furanose forms) 5

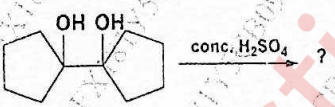
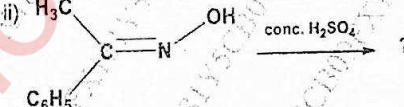
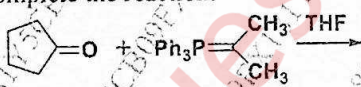
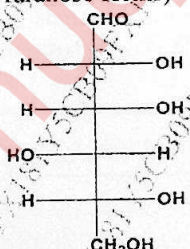
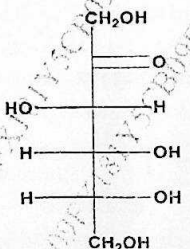


- E) a) Write the reactions for complete methylation of α -D-glucopyranose in a stepwise manner. 3
- b) Draw chair conformations of α and β forms of D-glucopyranose. 2
- F) a) How will you convert D-Glucose into D-Arabinose 3
- b) Write the reactions for oxidation of D-glucose using: 2
- Bromine water
 - Conc: HNO_3

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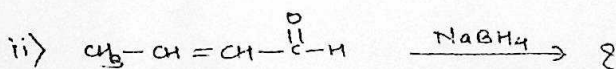
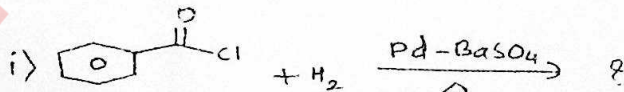
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- F) Explain in detail the preparation of a tripeptide by using the Merrifield solid phase peptide synthesis? 5
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- A) What is Favorskii rearrangement? Explain with suitable example. 5
- B) a) Complete the following reactions. Give the name of reactions. 3
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- b) Complete the reaction. 2
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- b) Write the reactions for oxidation of D-glucose using: 2
- Bromine water
 - Conc. HNO_3

- Q.3. Attempt any four of the following.** 20
- A) Explain how IR spectrum is used to determine the following: 5
1. If the given compound is aromatic.
 2. The two given compounds are identical
- B) a) Explain the effect of magnetic anisotropy on aldehydic protons? 3
 b) What is chemical shift? How is it expressed? 2
- C) a) Give the structure of the following pyrimidine bases present in nucleic acid? 3
1. Cytosine
 2. Uracil
 3. Thymine
- b) Draw the structure of sugars present in DNA & RNA. 2
- D) a) Explain the controlled hydrolysis of nucleic acids. 3
 b) What are nucleosides? Draw the structure of Adenosine. 2
- E) An organic compound has the molecular formula C_4H_8O . Determine the index of its hydrogen deficiency and deduce its structural formula from the following spectral data: 2
- IR spectrum: It shows a sharp band at 1740 cm^{-1}
 PMR spectrum: It shows a doublet at $\delta\ 1.1\text{ ppm}$ (6H), multiplet at $\delta\ 2.3\text{ ppm}$ (1H) and a doublet at $\delta\ 9.4\text{ ppm}$ (1H).
- F) An organic compound has the molecular formula M.F. $C_8H_{10}O$. Determine the index of its hydrogen deficiency and deduce its structural formula from the following spectral data. 5
- IR Spectrum (cm^{-1}): 3500, 1600, 1570, 760 & 710.
 PMR Spectrum (in $\delta\text{ ppm}$): 1.6 (3H,d), 4.9 (1H,q), 7.4 (5H,m), 4.2 (1H,s, D_2O exchangeable). Suggest a structure for the compound and justify your answer.

- Q.4 Attempt any four of the following.** 20
- A) a) What is Ziegler-Natta catalyst? Explain the stereoisomerism taking example of polypropylene. 3
 b) Give the preparation and uses of PVC. 2
- B) a) Explain the following terms with example: 3
- i) Elastomers
 - ii) Fibres
 - iii) Plasticiser
- b) Give any two biomedical uses of synthetic polymers. 2
- C) a) Give the structure, properties and uses of polyurethane. 3
 b) Write a note on vulcanisation of rubber. 2
- D) How is Raney-Ni prepared? Write its reduction reactions with following compounds? 2
- i) Alkenes
 - ii) Nitriles
 - iii) Nitro compounds
- E) a) What is the action of $LiAlH_4$ on the following compounds: 3
- i) Acetone
 - ii) Methyl cyanide
 - iii) Nitro ethane
- b) Complete the following reactions



- F) a) What is epoxidation? What is the reagent used. Explain the selectivity in the reaction with a suitable example. 3
 b) Write any two uses of SeO_2 . 2

- Q.5 A) Select the correct option and complete the following statements: (any five) 5
- A carbon atom, to which enantiotopic ligands are attached, is called.....
 - Chiral centre
 - Prochiral centre
 - Ei mechanism
 - None of above
 - The stereochemical equivalence or non-equivalence of different atoms or groups in a molecule is called.....
 - Topocity
 - Distereoselectivity
 - Enantioselectivity
 - Stereoselectivity
 - S_N1 reaction proceeds via..... of configuration.
 - Retention
 - Inversion
 - Racemization
 - None of above
 - Meso tartaric acid has.....
 - Plane of symmetry
 - Centre of symmetry
 - Alternating axis of symmetry
 - None of above
 - Hydroxylation of alkene by $KMnO_4$ is..... reaction.
 - Stereoselective
 - Stereospecific
 - Stereoselective and Stereospecific
 - None of above
 - The $-CO-NH-$ linkage is called.....
 - Peptide bond
 - Aminine bond
 - Aldehyde bond
 - Ketone bond
 - is used in Strecker synthesis.
 - K-phthalimide
 - Phthalimide
 - Aldehyde
 - Phenyl hydrazine
 - The amino acids which are synthesized by human body are called..... α -amino acids:
 - Essential
 - Non-essential
 - Acidic
 - Basic

- Q.5 B) State whether true or false: (any five) 5
- D-glucose and D-galactose are epimers.
 - Alkyne is the product of Wittig reaction.
 - Beckmann rearrangement of ketoximes is stereospecific.
 - Pinacol rearrangement takes place in presence of base catalyst.
 - Glucose is a ketose.
 - Five moles of periodic acid are required per mole of D-Fructose.
 - Cellulose is a polysaccharide.

- Q.5 C) Fill in the blanks with correct alternatives given in the bracket: (any five) 5
(out-of-plane bending, deshielding, $1690-1720\text{ cm}^{-1}$, polyphosphate chain, solvent, RNA, $3200-3600\text{ cm}^{-1}$, cytoplasm, in-plane bending, three, standard, nucleus.)
- Carbon-tetrachloride is used as a ----- in PMR spectroscopy.
 - helps in protein synthesis.
 - DNA is found in the ----- of the cell.
 - The backbone of nucleic acid molecule is a -----.
 - A broad absorption band due to $-O-H$ stretching in alcohols appears in the region around -----.
 - For water molecule the number of possible modes of vibrations is ----.
 - The presence of electron withdrawing groups causes ----- effect on the adjacent protons..
 - Rocking is a type of ----- vibration.

Q.5 D) Match the columns: (any five)

- Column A**
- a) Stabilizers
 - b) Buna-S rubber
 - c) Neoprene
 - d) PHBV
 - e) Lindlar's catalyst
 - f) Adam catalyst
 - g) NBS

- Column B**
- (i) Cold rubber.
 - (ii) Chemoselective oxidising agent
 - (iii) CaO
 - (iv) Allylic or benzylic bromination
 - (v) Elastomers
 - (vi) Chloroprene.
 - (vii) Biodegradable polymer
 - (viii) Partially reduction of alkynes
 - (ix) PtO_2
