Time: 3 Hrs **Marks:100**

Please check whether you have got the right question paper.

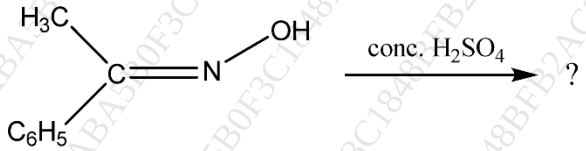
N.B: 1. All questions are compulsory.
2. Figures to right indicates full marks

Q.1 **Answer ANY FOUR of the following:**

A		Discuss whether the addition of bromine to 2-butene is stereospecific or stereoselective.	**5**
B		Explain the mechanism and stereochemistry of S_Ni reactions using suitable example.	**5**
C	**a)**	Write a note on enantiotopic ligands.	**3**
	b)	Explain the term: Prochiral centre	**2**
D		Explain the stereochemistry of $KMnO_4$ oxidation of maleic acid and fumaric acid.	**5**
E	**a)**	What are α-amino acids? How are they classified?	**3**
	b)	Give preparation of alanine by Strecker synthesis.	**2**
F		Explain stepwise synthesis of a tripeptide using Merrifield's solid phase synthesis method. Give two advantages of this method of synthesis.	**5**

Q.2 **Answer ANY FOUR of the following:**

A Complete the following reaction, identify it and explain its mechanism: **5**



B		What is Michael reaction? Explain the mechanism of the reaction. Identify the intermediate.	**5**
C		Give reactions for the following:	
	a)	Conversion of D-Glucose into D-Arabinose	**3**
	b)	Action of conc. HNO_3 on D-Glucose and D-Fructose	**2**
D	**a)**	Write stepwise reactions to show the action of phenylhydrazine on D- Fructose?	**3**
	b)	Explain the phenomenon of mutarotation in Glucose.	**2**
E	**a)**	Draw the Fischer projection of D- Fructose and convert to Haworth formula (β-pyranose form).	**3**
	b)	What are epimers? Draw the structure of anyone epimer of D-Glucose.	**2**
F		Draw structures for the following: i) Enantiomer of D-Glucose ii) Open chain structure of Aldotriose iii) Product formed by action $NaBH_4$ on D-Glucose iv) Chair conformation of β-D-Glucopyranose v) Diastereomer of D-Glucose	**5**

Q.3 **Answer ANY FOUR of the following:**

A		Explain the following terms: i) Finger print region ii) Types of bending vibrations	**5**
B	**a)**	Explain how inductive effect plays an important role in deciding the value of chemical shift with a simple example?	**3**
	b)	Why TMS is used as a standard in PMR spectroscopy?	**2**
C	**a)**	Give the structure of pyrimidine bases present in DNA?	**3**
	b)	Distinguish between DNA & RNA?	**2**
D		Explain the primary structure of nucleic acids?	**5**

E 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**

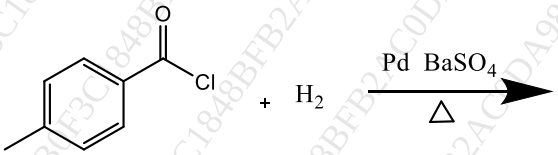
IR Spectrum (cm^{-1}): 3500,1600,1570,760 & 710

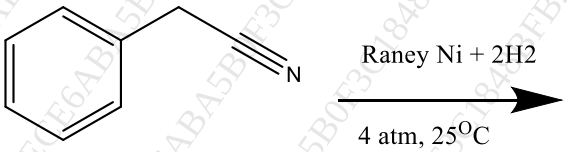
PMR Spectrum: (in δ ppm): 1.6(3H,d) , 4.2(1H, s,D_2O exchangeable) , 4.9 (1H,q) , 7.4 (5H,m) . Suggest a structure for the compound and justify your answer.

F An organic compound has the molecular formula M.F $C_9H_{10}O_2$. Determine the index of its hydrogen deficiency and suggest a structure for the compound. Justify your answer? **5**
IR Spectrum (cm^{-1}) : 3100 (broad), 1715, 1600, 750 & 710
PMR Spectrum: (in δ ppm): 1.5(3H,d) , 3.7(1H,q), 7.5 (m, 5H) , 11.8 (1H, s)

Q.4 Answer ANY FOUR of the following:

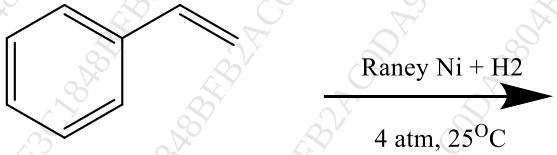
A Complete the following reactions **5**

i) 

ii) 

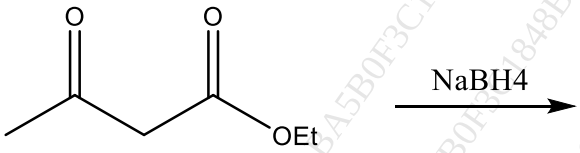
iii) 

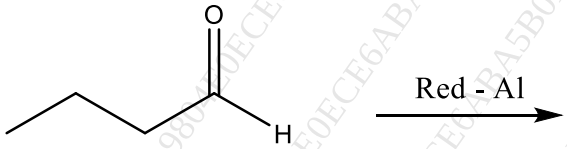
iv) 

v) 

B a) What is Lindlar's catalyst? Explain its use in partial reduction of alkynes and its selectivity? **3**

b) Complete the following reactions: **2**

i) 

ii) 

C **a)** How are polymers classified on the basis of properties of polymers? **3**

b) Give the preparation and uses of Nylon 6,6? **2**

D **a)** Explain the following terms with examples **3**
i) Plasticizers ii) Stabilizer iii) Fillers

b) Write the synthesis of Buna – S rubber. **2**

E **a)** Explain reaction of epoxidation using m-CPBA. **3**

b) Explain the allylic and benzylic bromination using NBS **2**

F **a)** Draw the structure and give one use of the following polymers- **3**
i) Neoprene ii) Nylon 6 iii) Polyester

b) Write the structure and use of Ziegler Natta catalyst. **2**

Q.5 A State whether the following are true or false: (any five) **5**

a) The two faces in ethyl methyl ketone are homotopic in nature.

b) E_2 elimination reaction requires antiperiplanar geometry of the two leaving groups of substrates.

c) Epoxide contains a three membered heterocyclic ring with one oxygen atom present in the ring.

d) All stereospecific reactions are not stereoselective in nature.

e) The reactions where only one diastereomer of all the possible diastereomers of the product is formed, are known as diastereoselective reactions.

f) A dipeptide is formed from two α-amino acids.

g) K-phthalimide is used as one of the reactants in Gabriel's synthesis of α-amino acids.

h) Proteins are formed by ester linkages between different α-amino acids.

B Choose the most correct option to answer the following **(ANY FIVE):** **5**

a) What is the intermediate formed in Pinacol-Pinacolone rearrangement?
i) Carbocation iii) Carbanion
ii) Nitrene iv) Carbene

b) What is the base catalysed rearrangement of α-haloketones to carboxylic acid derivatives called?
i) Beckmann reaction iii) Favorski reaction
ii) Wittig reaction iv) Michael reaction

c) Which of the following is an aldotetrose?
i) Mannose iii) Xylose
ii) Threose iv) Arabinose

d) Identify the anomer of α-D-Fructofuranose.
i) α-D-Fructopyranose iii) β-D-Glucopyranose
ii) β-D-Glucofuranose iv) β-D- Fructofuranose.

e) Identify the product/s formed on treating D-Fructose with H_2/Ni.
i) Sorbitol iii) Sorbitol & Mannitol
ii) Mannitol iv) Allitol

f) How many moles of periodic acid are required per mole of D-Fructose?
i) 3 iii) 5
ii) 4 iv) 6

g) Identify the oligosaccharide.
i) Starch iii) Ribose
ii) Sucrose iv) Idose

C Fill in the blanks: (Any five) **5**

a) A sharp absorption band due to >C=O stretching in ketones appears in the region around ----------

b) Nujol is ----------

c) The position of the signals in NMR represents the ------ of the protons.

d) NMR is based on the property of ----------

e) In Tau scale the position of TMS signal is taken as ---------- ppm

f) The sugar component in DNA is ----------

g) Uracil is a derivative of ---------

h) A-T and C-G are called ---------- base pairs

D State whether the following are True or False: (any five) **5**

a) Polyhydroxyalkanoates (PHAs) is biodegradable polymer.

b) Lithium Aluminum hydride (LAH) is mild reducing agent.

c) In isotactic polymer all the side chains are arranged on the same side of the polymeric backbone.

d) Polycarbonates are used in bike helmets.

e) $RhCl(PPh_3)_3$ is Wilkinson's catalyst.

f) SeO_2 oxidises only active methyl or methylene group without affecting carbonyl group.

g) α- cyano acrylate can be used as artificial skin.

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