

Subject - Organic Chemistry - I

QP Code : 13419

(3 Hours)

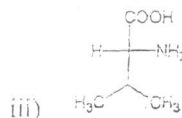
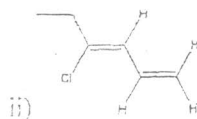
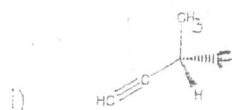
N.B.: 1. All questions are compulsory

Total Marks: 70

2. Figures to right indicate full marks

Q1) A) Answer the following questions: (12)

a. Assign E/Z or R/S or D/L notations and nomenclate the following molecules as per IUPAC rules (Any two):



b. Give suitable structures for the following compounds (Any two):

i. 3-Oxobutanoic acid

ii. 4-Bromomethoxybenzene

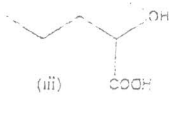
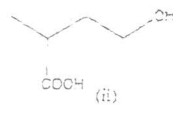
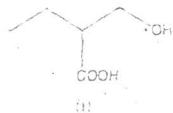
iii. Ethyl 3-methylbutanoate

c. Draw possible resonating structures for benzaldehyde and aniline.

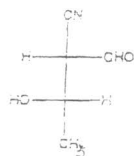
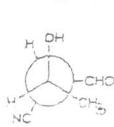
d. Rank the order of basicity for the following organic compounds and justify



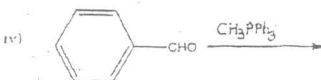
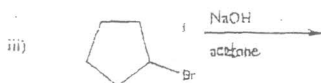
e. Rank the order of acidity for the following alcohol protons (-OH) and justify



f. On the basis of configuration, establish the relationship between following pair of molecules:



B) Give the products of the following reactions (Any three): (03)

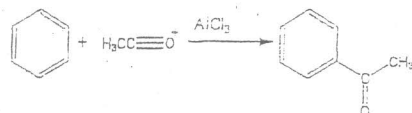


Q2.A) Identify the tautomeric system existing in the following pair of molecules (01)



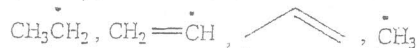
B) Identify the electrophiles in the given reaction (01)

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C) Answer the following questions: (06)

i) Arrange the following carbon radicals in increasing order of stability and justify the same:

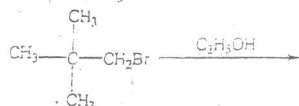


ii) Explain the stereochemistry of bromination of cis-2-butene.

iii) Give the structures of A and B in the following reaction:

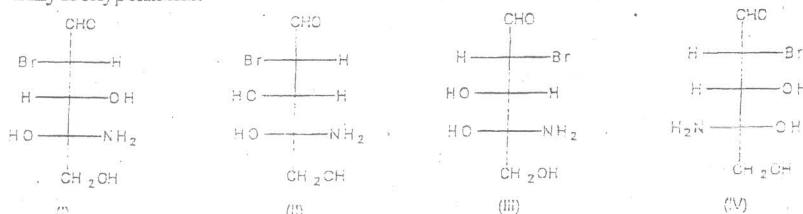


D) Complete the following reaction and give the detailed mechanism for the product formed by $\text{S}_{\text{N}}1$ pathway for the same: (05)



Q.3 A) i) Explain, using a suitable example, the difference between diastereomers and enantiomers. (02)

ii) Which of the following molecule is represented by (2S, 3R, 4R)-4-Amino-2-bromo-3, 4, 5-trihydroxypentanal: (01)



B) Explain the effect of following factors on elimination reaction via E_1 and E_2 pathways: (04)

i) Basicity and nucleophilicity ii) Solvent iii) Substrate structure iv) Temperature

C) Give the structure of suitable alkene to obtain following products: (04)

- i) 1-Methylcyclopentan-1-ol, ii) Heptanedial,
iii) 2-Bromo-3,5-dimethylhexane iv) 1,1-Dimethylcyclopropane

Q.4 A) Discuss the orientation and reactivity of the $-\text{NO}_2$ group towards electrophilic aromatic substitution. (02)

B) Friedel Crafts alkylation gives polysubstituted product whereas Friedel Crafts acylation does not. Give reasonable explanation for the given statement. (02)

C) Bring about the following conversions (Any two): (04)

- i) 2-Hexyne to trans-2, 3-hexanediol
ii) 2-Bromo-3-methylbutane to 3-Bromo-2-methylbutan-2-ol
iii) 2-Methyl-1-phenylpropan-2-ol to 1-Chloro-2-methyl-1-phenylpropane

D) Give the product of the following reactions (Any Three): (03)

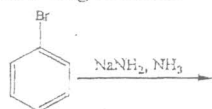
- i) 3-Hexyne $\xrightarrow{\text{Lindlar catalyst}}$
ii) 2 mols of Isobutylene $\xrightarrow{\text{H}_2\text{SO}_4, 80^\circ\text{C}}$
iii) $(\text{CH}_3)_2\text{CuLi} + \text{n-butylbromide} \longrightarrow$
iv) Ethyne $\xrightarrow{\text{HgSO}_4, \text{H}_2\text{SO}_4}$

Q5 A) Explain the following terms: (02)

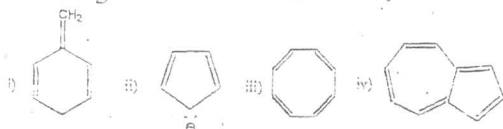
- i) Chiral molecule ii) Atropisomerism

B) Give the scheme for separation of (\pm) 2-Nitropropanoic acid. (02)

C) Explain the elimination-addition mechanism for nucleophilic aromatic substitution. Give the product of the following reaction: (03)



D) Identify whether the given molecules are aromatic, antiaromatic or non-aromatic. (04)

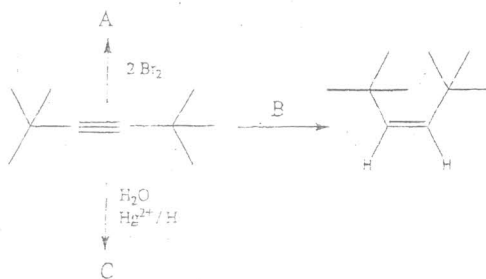


Q.6 A) When 1,3-butadiene is treated with Br_2 in presence of a peroxide, following two compounds are obtained i) $\text{BrCH}_2\text{CHBrCH}=\text{CH}_2$ and ii) $\text{BrCH}_2=\text{CHCH}_2\text{Br}$. Account in detail for the formation of these two products. (02)

B). Arrange the compounds in the order of reactivity toward $\text{S}_{\text{N}}2$ displacement reaction. Justify (03)

1-bromo-3-methylbutane, 2-bromo-2-methylbutane, 3-bromo-2-methylbutane

C) Identify A, B, C in the following reactions: (03)



D) Predict the product for the following reactions (any three): (03)

