

(3 Hours)

N.B.: 1. All questions are compulsory

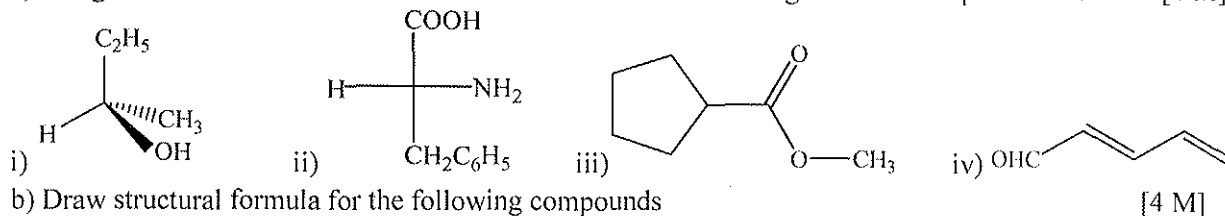
Total Marks: 80

2. Answer all subquestions together

3. Figures to right indicate full marks

Q.1 A] Answer the following questions:

a) Assign E/Z or R/S or D/L notations and nomenclate the following molecules as per IUPAC rules [4 M]



b) Draw structural formula for the following compounds [4 M]

i) (S)- 3-Amino-3-methyl-4-hexen-2-one

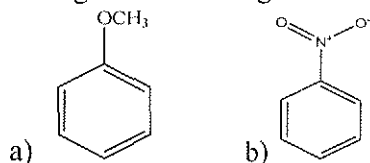
ii) (E)-1-Phenyl-2,3,3-trimethyl-1-butene

iii) (R) 2,3- dhydroxypropanal iv) ethyl 3-butenate

Q.1 B] Answer the following questions (Choice 6 out of 7) [12M]

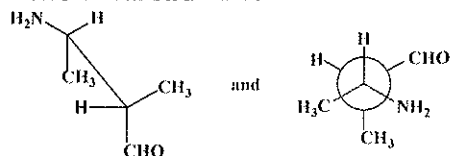
i. Draw and identify the HOMO and LUMO of Ethene

ii. Write resonating structures for the following molecule and give the order of stability



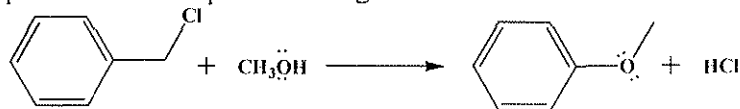
iii. Represent Fischer and Newman projection formulae for the 3-Amino-3-bromo-2-methylpentanal

iv. Identify the relationship between two chiral structures



v. Give the structure of conjugate acid/base of methyl amine and hydrochloric acid

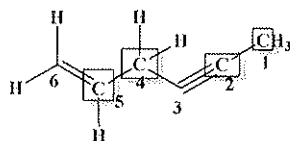
vi. Identify the electrophiles and nucleophiles in the given reactions



vii. What is the order of stability of carbocations? Justify the same.

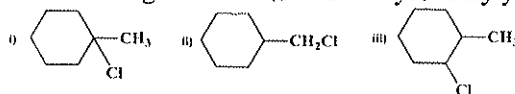
Q.2. i. Draw the molecular orbital energy diagram for ketone. Label the orbitals. [2M]

ii. Identify the hybridization state of the highlighted carbon atoms (1, 2, 4 and 5) from the given molecule [2M]



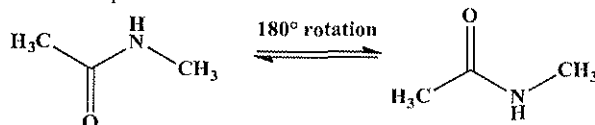
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iii. List the following alkyl halides in decreasing order of S_N2 reactivity. Justify your answer.

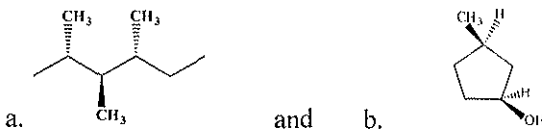


Propose the mechanism of the most active compound with alcoholic NaOH. [4M]

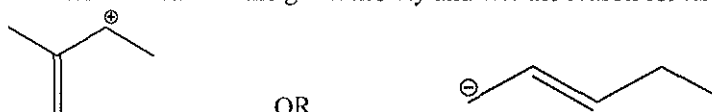
iv. Neatly draw and label the energy profile diagram to depict the following reactions and identify and draw the transition state/s and define an equilibrium constant for the same. [4M]



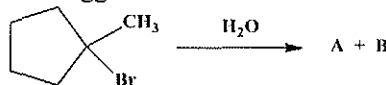
Q.3 i. Discuss Bayer strain in cycloalkanes OR Discuss the chirality of the following compounds and Justify [2M]



ii. Give the stable active intermediate/s for the given moiety and cite the reason for its stability [2M]

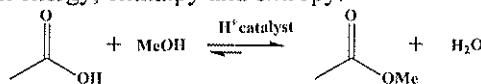


iii. Complete the following reaction and suggest the mechanism [4M]



iv. Write a note and comment on the stereochemistry of bromination reaction of cis 2-butene [4M]

Q. 4 i. Suggest suitable strategies to make the equilibrium favor in the given below esterification reaction. Discuss the relationship between energy, enthalpy and entropy. [4M]



ii. a. Which functional group of the following pair is expected to exhibit H-bonding and why. Justify your answer. Ethanol and diethylether [2M]

b. On the basis of solubility, justify the increasing order of logP for the following compounds [2M]
Phenol (logP=1.5), benzene (logP=2.1), chlorobenzene (logP= 2.9)

iii. Attempt the following conversions [4M]

- Acetophenone to acetic acid
- Benzoyl chloride to ethyl benzoate
- Benzyl chloride to benzoic acid
- Phenyl ethyl ether to phenol

Q.5 i. Write the order of acidity between acetic acid, fluoroacetic acid, difluoroacetic acid and trifluoroacetic acid and justify [2M]

ii. Give an example to justify following statement - Delocalization of the negative charge stabilizes the conjugate base [2M]

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ii. Name the least stable and most stable conformation of cyclohexane and justify your answer by drawing the energy profile diagram [4M]

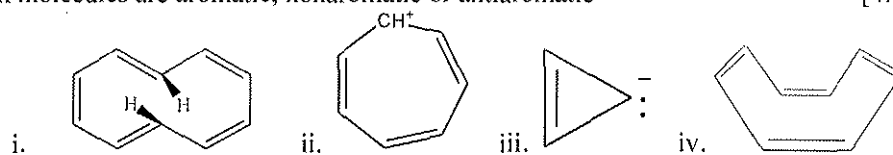
iii. Enlist examples of the functional groups which are responsible for Dipole-dipole OR hydrophobic interactions. Suggest a suitable modification of this group which will enhance or decrease this interaction [4M]

OR

An active pharmaceutical agent possesses phenolic, ether and ester functional groups. What precautions should be taken during its formulation?

Q.6 i. With the help of suitable example explain kinetic Vs thermodynamically controlled reactions [4M]

ii. Identify the given molecules are aromatic, nonaromatic or antiaromatic [4M]



iii. Write 1°, 2° and 3° aromatic amine distinguishing test by giving suitable examples [4M]
