

2 SEM TDC CHMH (CBCS) C 3

2022

(June/July)

CHEMISTRY

(Core)

Paper : C-3

(Organic Chemistry)

Full Marks : 53

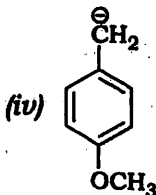
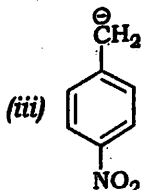
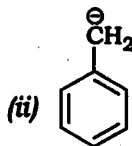
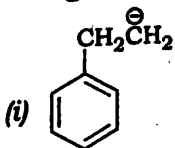
Pass Marks : 21

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

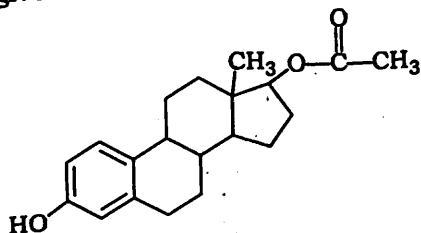
1. Choose the correct answer from the following : 1×5=5

(a) Which is the most stable carbanion among the following?



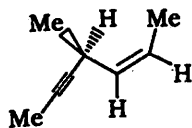
(2)

- (b) How many chiral carbons are present in the given molecule?



- (i) 1
(ii) 5
(iii) 3
(iv) 10

- (c) Hydrogenation of the following compound in the presence of poisoned palladium catalyst gives



- (i) an optically active compound
(ii) an optically inactive compound
(iii) a racemic mixture
(iv) a diastereomeric mixture

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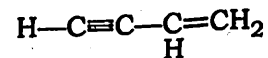
(3)

- (d) The IUPAC name of the following compound



is

- (i) neononane
(ii) tetraethyl carbon
(iii) 2-ethyl pentane
(iv) 3,3-diethyl pentane
- (e) The hybridization of C atoms in C—C single bond of



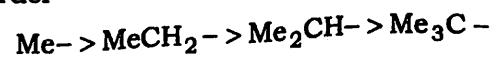
is

- (i) sp^3-sp^3 (ii) sp^2-sp^3
(iii) $sp-sp^2$ (iv) sp^3-sp

UNIT—I

2. Answer the following questions : 2×3=6

- (a) What do you mean by nucleophilicity and basicity?
(b) Alkyl groups attached to the benzene ring have electron releasing effect in the order



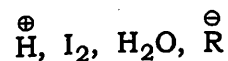
Explain this observation.

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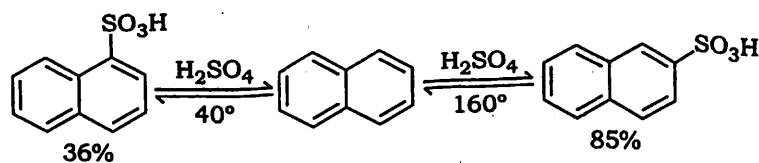
(4)

- (c) Select soft and hard acids and bases from the following :



Or

Identify the following reactions as kinetically controlled and thermodynamically controlled :

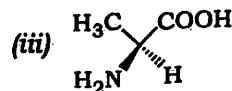
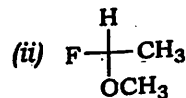
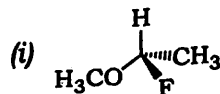


Draw the energy profile diagram for the above reactions.

UNIT—II

3. Answer the following questions : $2 \times 6 = 12$

- (a) Specify the following stereoisomers as *R* and *S* (any two) : $1 \times 2 = 2$

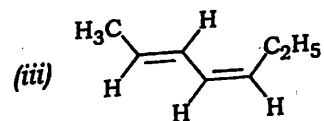
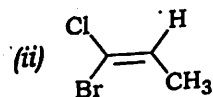
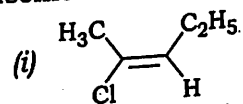


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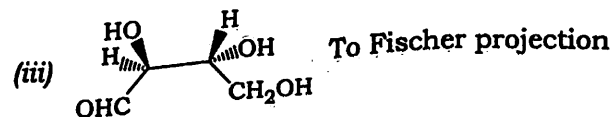
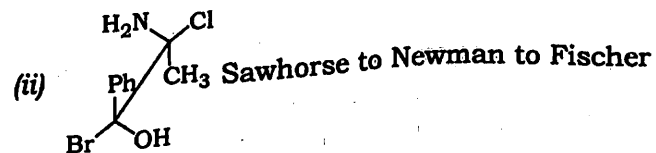
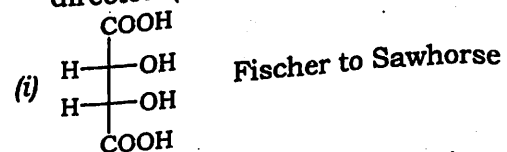
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(5)

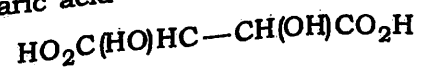
- (b) Specify the following geometrical isomers as *E* and *Z* (any two) : $1 \times 2 = 2$



- (c) Interconvert the following projections as directed (any two) : $1 \times 2 = 2$



- (d) Draw all the possible stereoisomers of tartaric acid



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(Turn Over)

(6)

- (e) Draw and give the stereochemical designation for the geometrical isomers of 2,4-heptadiene.
- (f) Active 2-benzoyl propanoic acid undergoes racemization when treated with NaOC_2H_5 in ethanol. Explain.

UNIT—III

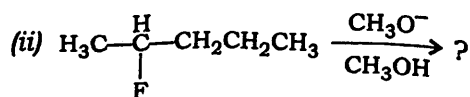
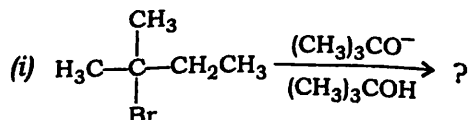
4. Answer the following questions :

(a) Prepare *n*-pentane with the help of Corey-House synthesis. 2

(b) An alkane has a molecular mass of 72. It forms only one monosubstituted product on chlorination in the presence of sunlight. Suggest a structure for the alkane. 1

(c) Addition of bromine in CCl_4 to *cis*-2-butene gives (*±*)-2,3-dibromobutane while that for *trans*-2-butene gives *meso*-2,3-dibromobutane. Explain this with mechanism. 3

(d) Write the product(s) of the following elimination reactions : $1\frac{1}{2} \times 2 = 3$



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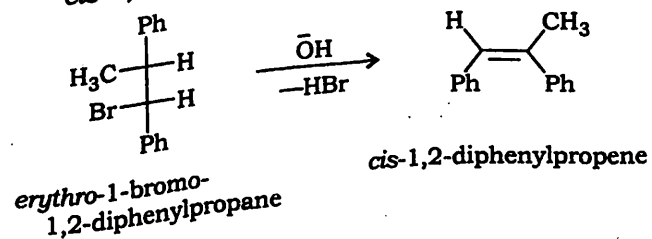
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(7)

- (e) "Markownikov's addition reaction is a regioselective reaction." Justify the statement. 2
- (f) What do you mean by stereoselective and stereospecific reactions? Explain by giving examples of each. $2+1=3$
- (g) Write the mechanism of 1,4-addition of Br_2 to 1,3-butadiene. 2

Or

What is the stereoelectronic requirement of an *E2* process? Why *erythro*-1-bromo-1,2-diphenylpropane on base induced dehydrobromination yields *cis*-1,2-diphenylpropene exclusively?



UNIT—IV

5. (a) Explain why Baeyer strain theory is not applicable to higher ring compounds. 2
- (b) Draw the chair- and boat-conformation of cyclohexane in Newman projection. 2

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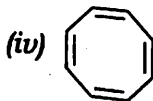
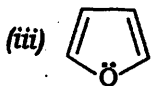
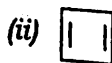
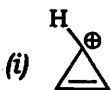
Or

Explain why equatorial methylcyclohexane is more stable than axial methylcyclohexane.

- (c) Discuss the factors responsible for the stability of a conformation. 2
- (d) Draw the energy profile diagram for the conformations of *n*-butane. 2

UNIT—V

6. (a) Which of the following compounds are aromatic, anti-aromatic and non-aromatic? 2



- (b) Write the mechanism of Friedel-Crafts alkylation of benzene. 2
- (c) Discuss the directing influence of $-\text{OCH}_3$ group towards the electrophilic aromatic substitution reactions. 2
