

2 SEM TDC CHMH (CBCS) C 3

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(May/June)

CHEMISTRY

(Core)

Paper : C-3

(**Organic Chemistry**)

Full Marks : 53

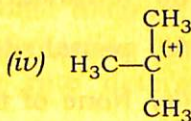
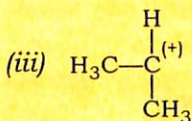
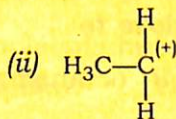
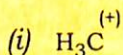
Pass Marks : 21

Time : 3 hours

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

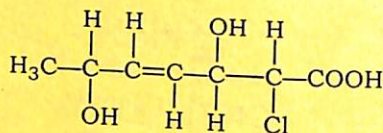
1. Choose the correct answer from the following : 1×5=5

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



(2)

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



- (i) 1
(ii) 2
(iii) 3
(iv) None of the above
- (c) The reagent used in Corey-House synthesis is
- (i) R_2CuLi
(ii) Li_2CuCl_4
(iii) RCuLi
(iv) R_2CuLi_2
- (d) According to Baeyer's strain theory, cyclopentane is most stable cyclic compound because its bond angles are close to
- (i) octahedral
(ii) tetrahedral
(iii) pentahedral
(iv) None of the above

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(3)

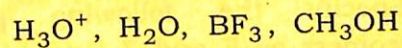
- (e) Which one of the following does not give isopropylbenzene as a product upon reaction with benzene?

- (i) $(\text{CH}_3)_2\text{CHCl}/\text{AlCl}_3$
(ii) $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}/\text{AlCl}_3$
(iii) $\text{CH}_3\text{CH}=\text{CH}_2/\text{H}_3\text{PO}_4$
(iv) $(\text{CH}_3)_2\text{C}=\text{CH}_2/\text{H}_3\text{PO}_4$

UNIT—I

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

- (a) Define electrophilic reagent and nucleophilic reagent. Select the electrophilic and nucleophilic reagent from the following :



- (b) Benzyl carbocation is more stable than propyl carbocation. Explain.

Or

CO_2 is a non-polar molecule but SO_2 is a polar molecule. Explain.

- (c) Draw the energy profile diagram for a two-step endothermic reaction in which second step is the rate determining step.

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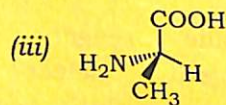
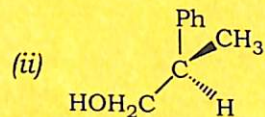
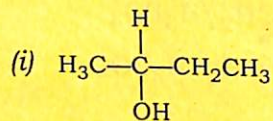
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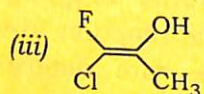
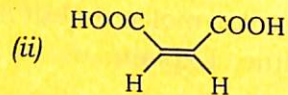
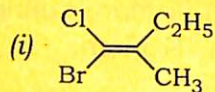
UNIT—II

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

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



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

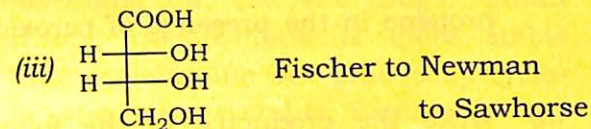
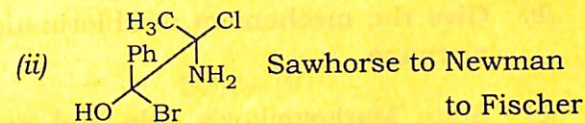
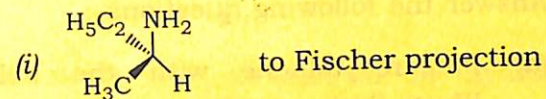


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(5)

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



(d) Explain why racemic tartaric acid can be resolved but not *meso*-tartaric acid. Give the chemical method of resolution. 2

(e) A 1.5 g of organic compound was dissolved in 10 ml of alcohol and placed the sample cell of 5 cm path length. The observed rotation of sodium *D*-line was 1.21° . Calculate the specific rotation of the compound. 2

(f) Describe the necessary conditions for a molecule to exhibit optical isomerism. 2

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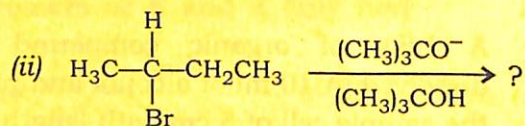
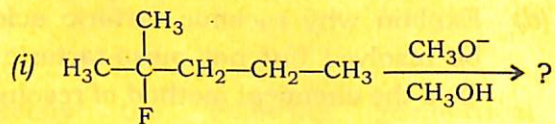
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UNIT—III

4. Answer the following questions :

- (a) Prepare toluene with the help of Wurtz-Fittig reaction. 2
- (b) Give the mechanism of chlorination of methane. 2
- (c) State Markovnikov's rule and explain the mechanism of addition of HBr to propene in the presence of peroxide. 1+2=3
- (d) Write the product(s) of the following elimination reactions : 1½×2=3



- (e) Which dienophile is more reactive in Diels-Alder reaction? 2
 $\text{CH}_2=\text{CHCHO}$ or $\text{CH}_2=\text{CHCH}_2\text{CHO}$
- (f) What happens when 1,3-butadiene is treated with HBr? 2

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(7)

- (g) How will you distinguish between 1-butyne and 2-butyne? 2

Or

Illustrate the mechanism of hydroboration-oxidation reaction.

UNIT—IV

5. (a) According to Baeyer's angle strain theory, cyclopentane is more stable than cyclohexane but practically cyclohexane is more stable. Explain. 2
- (b) Draw the different conformations of *n*-butane (Newman projection formula) and show which one is most stable. 2
- (c) How will you synthesize cyclopentane from diethyl adipate? 2
- (d) Draw the energy profile diagram for the conformations of cyclohexane. 2

Or

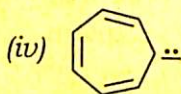
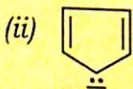
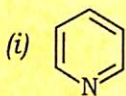
Chair conformation of cyclohexane is more stable than boat conformation. Explain.

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UNIT—V

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



- (b) Discuss the mechanism of sulphonation of benzene. 2

- (c) Explain why nitration of chlorobenzene gives *ortho*- and *para*-chloronitrobenzene but the chlorination of nitrobenzene gives *meta*-chlorobenzene. 2

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