2023

(NEP—2020)

(1st Semester)

CHEMISTRY (MAJOR)

(Organic Chemistry—I)

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

(SECTION : A—OBJECTIVE)

(*Marks* : 10)

Tick (✓) the correct answer in the brackets provided : 1×10=10

1. The ease of abstraction of different classes of hydrogen in halogenation reaction is in the order
   (a) 1°-hydrogen > 2°-hydrogen > 3°-hydrogen ( )
   (b) 3°-hydrogen > 1°-hydrogen > 2°-hydrogen ( )
   (c) 2°-hydrogen > 3°-hydrogen > 1°-hydrogen ( )
   (d) 3°-hydrogen > 2°-hydrogen > 1°-hydrogen ( )

2. The formation of alkanes by action of carbonyl-group on amalgamated zinc in hydrochloric acid is called
   (a) Wurtz reaction ( )
   (b) Kolbe reaction ( )
   (c) Clemmensen reduction ( )
   (d) Corey-House synthesis ( )

3. Which one of the following will give iodoform test?

(a) $CH_3CH_2CH_2OH$ ( )

(b) $CH_3CH(OH)CH_3$ ( )

(c) $C_6H_5CH_2OH$ ( )

(d) $(CH_3)_3COH$ ( )

4. Alcohols on treatment with Grignard's reagent give

(a) alkene ( )

(b) aldehyde ( )

(c) alkane ( )

(d) alkanoic acid ( )

5. Ethers when treated with strong acids form salts known as

(a) hydronium salts ( )

(b) iminium salts ( )

(c) hydrogen sulphates ( )

(d) oxonium salts ( )

6. When ethyl methyl ether is treated with HI, the resulting iodide is

(a) methyl iodide ( )

(b) ethyl iodide ( )

(c) propyl iodide ( )

(d) both methyl and ethyl iodides ( )

7. The hybridization state of C-atom in carbonyl compound is

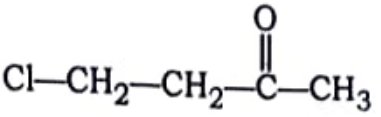
(a) sp ( )

(b) sp^2 ( )

(c) sp^3 ( )

(d) dsp^2 ( )

8. The IUPAC name of the compound



is

(a) 1-chlorobutan-3-one ( )

(b) 4-chlorobutan-2-one ( )

(c) 3-chlorobutan-2-one ( )

(d) 3-chloro-1-methylpropan-1-one ( )

9. Dehydration of alcohol is an example of

(a) elimination reaction ( )

(b) addition reaction ( )

(c) substitution reaction ( )

(d) redox reaction ( )

10. The formation of cyanohydrin from a ketone is an example of

(a) electrophilic addition ( )

(b) electrophilic substitution ( )

(c) nucleophilic substitution ( )

(d) nucleophilic addition ( )

(SECTION : B—SHORT ANSWERS)

(*Marks* : 15)

Answer *five* questions, taking at least *one* from each Unit : 3×5=15

UNIT—I

1. Write the Corey-House method for the synthesis of *n*-propane.

2. "Straight chain alkane has higher boiling point than its branch chain isomers." Explain.

UNIT—II

3. Explain why lower alcohols are soluble in water, but higher alcohols are not.

4. Write the chemical reactions of glycerol with—

   (a) oxalic acid;

   (b) conc. HNO_3.

UNIT—III

5. Complete the following reaction :

$$H_3C-\underset{\displaystyle CH_3}{\overset{\displaystyle |}{C}}=CH_2 + CH_3OH \xrightarrow{Hg(OCOCF_3)_2} A \xrightarrow{NaBH_4} B$$

6. Complete the following reaction and write its mechanism :

$$CH_3CH_2MgBr + H_2C\overset{O}{\diagup\diagdown}CH_2 \longrightarrow ? \xrightarrow{H_3O^+} ?$$

UNIT—IV

7. "Aldehydes are more reactive than ketones towards a nucleophile." Explain.

8. Draw and explain the structure of carbonyl group.

(SECTION : C—DESCRIPTIVE)

(*Marks* : 50)

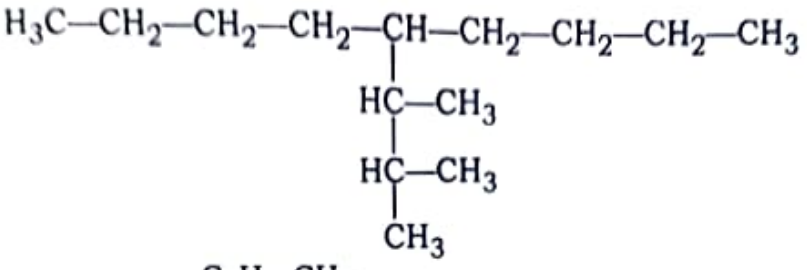
Answer *five* questions, taking at least *one* from each Unit : 10×5=50

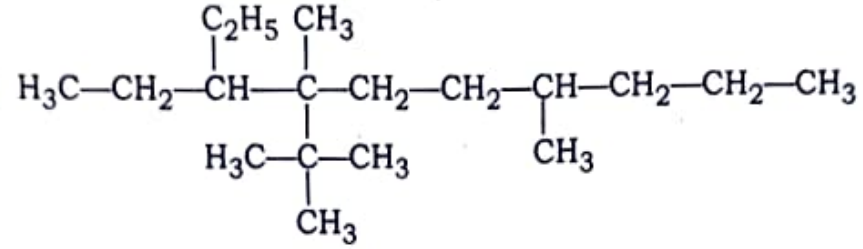
UNIT—I

1. *(a)* Explain how methane can be obtained by decarboxylation of sodium acetate. Write the complete mechanism of the reaction. 2+3=5

   (b) Explain halogenation of alkanes with a suitable example. 3

(c) Write the IUPAC nomenclature of the following compounds : 1×2=2

(i) 

(ii) 

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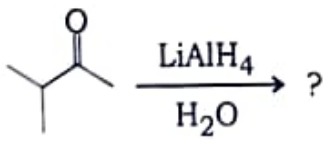
(b) What is isomerism? Explain functional group isomerism and metamerism with example. 1+4=5

UNIT—II

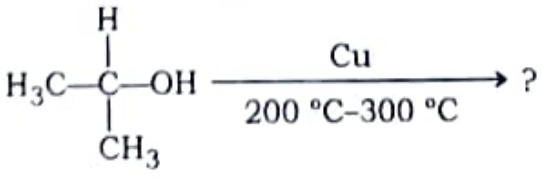
3. (a) Explain Victor Meyer's test to distinguish among 1°-, 2°- and 3°-alcohols. 4

(b) How is glycerol obtained from fats or oils? Write the chemical reaction. 3

(c) Complete the following chemical reactions (mechanism not required) : 1×3=3

(i) 

(ii) $CH_3COOH + C_2H_5OH \overset{H^+}{\rightleftharpoons} ?$

(iii) 

4. (a) Describe Lucas test to distinguish among 1°-, 2°- and 3°-alcohols. 3

(b) Complete the following reactions with suitable mechanisms (any *two*) : 3×2=6

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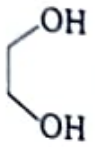
(ii)  $+ Pb(OCOCH_3)_4 \longrightarrow ?$

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UNIT—III

5. (a) Describe Ziesel's method for the estimation of methoxy group. 4

(b) Explain Williamson ether synthesis giving suitable example. 3

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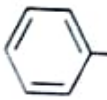
(ii)  $+ HNO_3 \xrightarrow{H_2SO_4} ?$

(iii) $H_3C—MgBr +$  $\xrightarrow{H_2O/H^{\oplus}} ?$

6. (a) Complete the given reaction with suitable mechanism : 1+3=4

$CH_3Li +$  $\xrightarrow{H_2O/H^{\oplus}} ?$

(b) Discuss with example the orientation of acid catalyzed ring opening in unsymmetrical epoxides. 3

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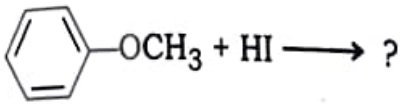
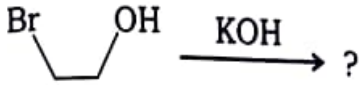
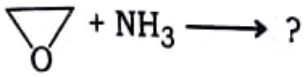
(i) 

(ii) 

(iii) 

UNIT—IV

7. (a) How will you obtain the following? Write the chemical equations : 2×2=4

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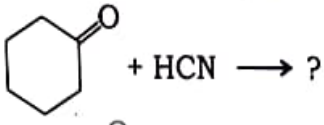
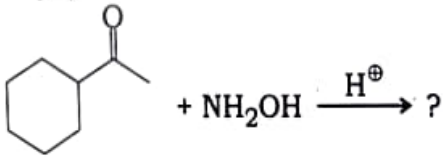
(b) Complete the following reactions with suitable mechanisms : 3×2=6

(i) 

(ii) 

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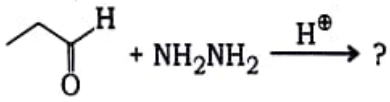
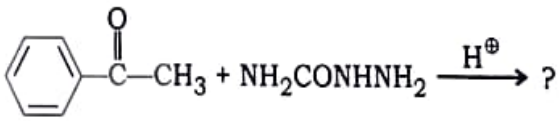
(i) 

(ii) 

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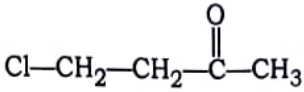

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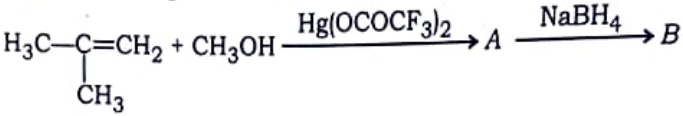

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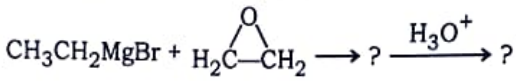

UNIT—IV

7. "Aldehydes are more reactive than ketones towards a nucleophile." Explain.

8. Draw and explain the structure of carbonyl group.

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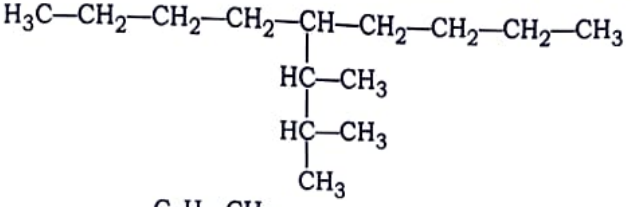
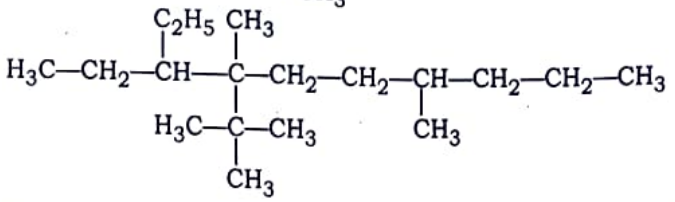
(i) 

(ii) 

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3. (a) Explain Victor Meyer's test to distinguish among 1°-, 2°- and 3°-alcohols. 4

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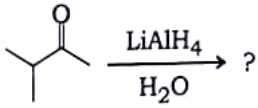
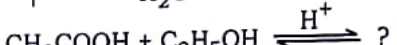
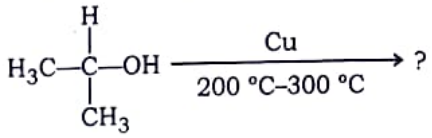
(i) 

(ii) 

(iii) 

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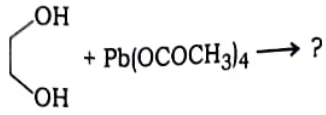
(ii)  $+ Pb(OCOCH_3)_4 \longrightarrow ?$

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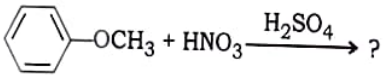
(ii) 

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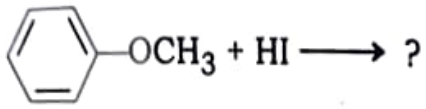
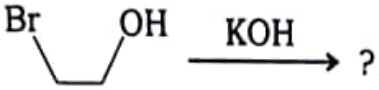
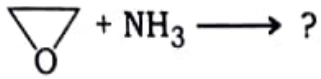
(i) 

(ii) 

(iii) 

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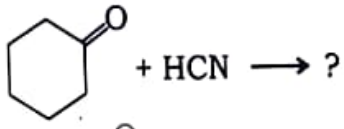
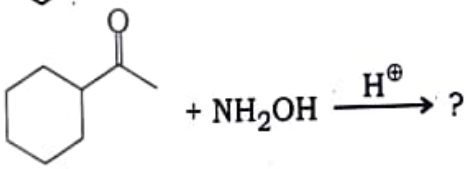
(i) 

(ii) 

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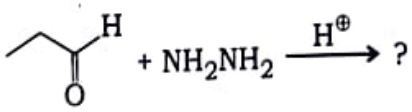
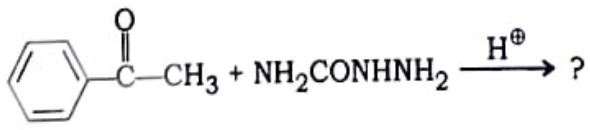
(i) 

(ii) 

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