(b) chlorine

(c) bromine

(d) iodine

2 0 2 4 (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 most reactive halogen in halogenation reaction of alkane is	
(a) fluorine ()	

2. Sulphonation of alkane is governed by

(a) nucleophilic substitution

(b) electrophilic substitution

(c) electrophilic addition

(d) free radical substitution

3.	Which one of the following is most acidic?			
	(a) CH ₃ OH ()			
	(b) CH ₃ CH ₂ OH ()			
	(c) (CH ₃) ₂ CHOH ()			
	(d) (CH ₃) ₃ COH ()			
4.	Which of the following is a trihydric alcohol?			
	(a) Citric acid ()			
	(b) Glycerol ()			
	(c) Glycine ()			
	(d) Glycol ()			
5.	With excess HI, glycerol gives			
	(a) propene ()			
	(b) allyl iodide			
	(c) isopropyl iodide ()			
	(d) 1,2,3-triiodopropane ()			
6.	In Victor Meyer test, the primary alcohol gives			
	(a) blue colour ()			
	(b) white precipitate ()			
	(c) red colour ()			
	(d) purple colour ()			
7.	The IUPAC name of the compound CH ₃ COCH ₂ CH ₂ CH ₃ is (a) methyl-n-propyl ketons			
	(a) methyl-n-propyl ketone ()			
	(b) 2-pentanone ()			
	(c) 3-pentanone ()			
	(d) n-propyl-methyl ketone			
8.	Aldehyde and ketone readily undergo			
	electrophilic addition			
	(b) electrophilic substitution			
	(c) nucleophilic addition			
	(d) nucleophilic substitution			
	, ,			

9.	The	product obtained from the reaction	
		$CH_3CH_2CN + CH_3Li \xrightarrow{H_3O^{\oplus}} ?$	
		0 2 0	
	is		
	(a)	carboxylic acid ()	
	(b)	ketone ()	
	(c)	amine ()	
	(d)	alcohol ()	
10.	Eth	ers are isomeric with	
	(a)	aldehydes ()	
	(b)	vinyl alcohols ()	
	(c)	alcohols ()	
	(d)	ketones ()	
		(SECTION : B—SHORT ANS	3
		(Marks : 15)	

SWERS)

Answer five questions, taking at least one from each Unit:

 $3 \times 5 = 15$

UNIT-I

- 1. How will you prepare *n*-butane from ethyl bromide using Wurtz method?
- 2. Write a note on halogenation of alkanes with suitable example.

UNIT—II

- 3. Explain the acidic character of alcohols and also compare the acidic strength of different types of alcohols (primary, secondary and tertiary).
- 4. Explain esterification reaction with suitable example.

UNIT-III

- Mention one method of preparation of epoxide. Write down the chemical reaction involved in it.
- 6. Complete the following reaction with suitable mechanism:

+ CH₃OH
$$\xrightarrow{1) \text{ Hg(OOCCF}_3)_2}$$
 ?

UNIT-IV

- 7. Write a short note on the polarity of carbonyl compound.
- 8. Complete the following reaction with suitable mechanism:

(SECTION : C-DESCRIPTIVE)

(Marks : 50)

Answer five questions, taking at least one from each Unit:

10×5=50

Unit-I

- (a) How will you synthesize n-butane using Corey-House synthesis? Write the chemical equation with suitable mechanism.
 - (b) Explain the relative reactivities of different classes of hydrogen in halogenation reaction of alkanes.
 - (c) Write a note on pyrolysis of alkanes taking suitable example.

/200

- 2. (a) Write a note on Kolbe's electrolytic method for the formation of n-ethane.
- 3

1

 $1 \times 2 = 2$

- (b) What will happen when n-hexane is heated with fuming nitric acid?
 Write the chemical reactions with suitable mechanism.
 1+3=4
- (c) What is primary carbon in alkane? Give example.
- (d) Complete the following chemical reactions (mechanism not required):

(i)
$$CH_4 + 2O_2 \xrightarrow{\Delta} A + B + 804 \text{ kJ mol}^{-1}$$

(ii)
$$CH_3CH_2CH_3 + :CH_2 \longrightarrow C + D$$

UNIT-II

- 3. (a) Explain a catalytic dehydrogenation (Cu/200-300 °C) of primary, secondary and tertiary alcohols giving suitable chemical equations. 4
 - (b) What is iodoform test? Write its chemical reaction.
 - (c) Complete the following chemical reactions (mechanism not required):

(i)
$$COOH \xrightarrow{LiAlH_4/Et_2O}$$
 ?

(ii)
$$CH_3(CH_2)_2COOC_2H_5 \xrightarrow{Na, C_2H_5OH} A + B$$

- (iii) $2CH_3CH_2OH + 2Na \longrightarrow C + D$
- 4. (a) How do 1°-, 2°- and 3°-alcohols react differently with HCl/anhydride ZnCl₂ solution? Write the chemical reactions.

3

 $1 \times 3 = 3$

(i)
$$CH_3CH_2OH + Conc. H_2SO_4 \xrightarrow{\Delta} ?$$

(ii)
$$OH CH_3 \xrightarrow{pTs}$$
?

(iii)
$$\stackrel{\text{O}}{\triangleright}$$
 C-OH $\stackrel{\text{Na}}{\longrightarrow}$?

(c) Why is alcohol acidic in nature?

UNIT-III

5. (a) Taking into account the chemical reaction given below, discuss in brief, the orientation of acid catalyzed ring opening in unsymmetrical epoxides. Complete the following reaction with suitable mechanism:

$$Me \xrightarrow{\text{Me}} \frac{1}{\text{O}} \xrightarrow{\text{1) } H^{\oplus}} ?$$

- (b) What is Williamson synthesis? Give suitable chemical reactions involved in it.
- (c) Complete the following reactions (mechanisms not required): 1×2=2

(i)
$$O$$
 CH₃ + HI $\xrightarrow{\text{heat}}$? + ?

(ii)
$$H_2C \xrightarrow{CH_2} \xrightarrow{C_2H_5OH/H^{\oplus}}$$
 ?

Contd

2+3=5

2×3=+

Complete the following reactions with suitable mechanisms: 3+2=5

3

 $3 \times 2 = 6$

(i) $H_3CH_2C-O-CH_2CH_3 + O_2 \longrightarrow ?$ (Autooxidation of ethers)

(ii) O
$$+ C_6H_5$$
—Li $\longrightarrow \frac{H_2O/H^{\oplus}}{}$?

- Write a brief note on Ziesel method for the estimation of alkoxy group (methoxy and ethoxy groups).
- Complete the following reactions (mechanisms not required): (c) $1 \times 2 = 2$

(i)
$$H_3C-H_2C-CH_2-OH \xrightarrow{H_2SO_4, 140 \text{ °C}}$$
 ? + ?

(ii)
$$H_2C - CH_2 \xrightarrow{NH_3}$$
 ?

Unit—IV

7. (a) Complete the following reactions with suitable mechanisms (any two):

(i)
$$H + NH_2NHCONH_2 \longrightarrow ?$$

(iii)
$$H_{3}C$$
 H + HCN $NaOH$?

(b) Write the IUPAC name of the following carbonyl compounds: $1 \times 2 = 2$

(i)
$$H_3CO$$
 Br O

(c) How will you prepare acetone from acetyl chloride? Write the chemical equation.

8. (a) What is Tollens' reagent? What will happen when acetaldehyde reacts

with Tollens' reagent? Write down the chemical equation involved in it.

3

2

(b) Complete the following reactions (mechanisms not required): 1+3=4

(i) OH
$$\frac{1) \text{ CH}_3 \text{Li}}{2) \text{ H}_3 \text{O}^{\oplus}}$$
 ?

(ii)
$$H_3C$$
 H + $NHNH_2$ NO_2 \longrightarrow ?

- (iii) $I_2 \longrightarrow ? + ?$
- (c) Complete the following reaction with suitable mechanism:

* * *

2024

(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 co	rrect ans	wer in th	e b	rackets provid	led:			
1.	The most	reactive	halogen	in	halogenation	reaction	of	alkane	is

1×10=10

- (a) fluorine ()
 (b) chlorine ()
 (c) bromine ()
 (d) iodine ()
- 2. Sulphonation of alkane is governed by
 - (a) nucleophilic substitution ()
 - (b) electrophilic substitution ()
 - (c) electrophilic addition ()
 - (d) free radical substitution ()

က်		Which one of the following is most acidic?
	(a)	CH ₃ OH ()
	(q)	CH_3CH_2OH ()
	(c)	(CH ₃) ₂ CHOH ()
	<i>(a)</i>	(CH ₃) ₃ COH ()
4.	Wh	Which of the following is a trihydric alcohol?
	(a)	Citric acid ()
	(<i>q</i>)	Glycerol ()
	(0)	Glycine ()
	<i>(a)</i>	Glycol ()
i.		With excess HI, glycerol gives
	(a)	propene ()
	(q)	allyl iodide ()
	(c)	isopropyl iodide ()
	<i>(a)</i>	1,2,3-triiodopropane ()
9	In	Victor Meyer test, the primary alcohol gives
	(a)	blue colour ()
	(<i>q</i>)	white precipitate ()
	(c)	red colour ()
	(q)	purple colour ()
7.		The IUPAC name of the compound CH ₃ COCH ₂ CH ₂ CH ₃ is
	(a)	5
	(q)	2-pentanone ()
	(c)	3-pentanone ()
	<i>(a)</i>	n-propyl-methyl ketone ()
œ.	Alde	Aldehyde and ketone readily undergo
	(a)	electrophilic addition ()
	(q)	electrophilic substitution ()
	(c)	nucleophilic addition ()
	<i>(a)</i>	nucleophilic substitution ()

| Contd.

reaction
ı the
fron
obtained
product
The
6

$$CH_3CH_2CN + CH_3Li \xrightarrow{H_3O^{\oplus}}$$
?

13

- carboxylic acid (a)
- ketone (q)
- amine (0)
- alcohol (q)
- Ethers are isomeric with 9
- aldehydes (a)
- vinyl alcohols (*q*)
- ketones (g)

alcohols

(C

(SECTION : B—SHORT ANSWERS

(Marks: 15)

 $3 \times 5 = 15$ Answer five questions, taking at least one from each Unit:

UNIT--

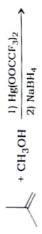
- 1. How will you prepare n-butane from ethyl bromide using Wurtz method?
- 2. Write a note on halogenation of alkanes with suitable example.

UNIT-II

- strength of different types of alcohols (primary, secondary and tertiary). acidic character of alcohols and also compare the Explain the e,
- Explain esterification reaction with suitable example 4

UNIT-III

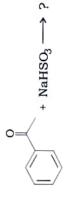
- Mention one method of preparation of epoxide. Write down the chemical reaction involved in it. i,
- Complete the following reaction with suitable mechanism: ø



a.

UNIT-IV

- Write a short note on the polarity of carbonyl compound. 7
- Complete the following reaction with suitable mechanism ø



(SECTION : C-DESCRIPTIVE)

(Marks: 50)

Answer five questions, taking at least one from each Unit:

UNIT

 $10 \times 5 = 50$

- 1+3=4How will you synthesize n-butane using Corey-House synthesis? Write the chemical equation with suitable mechanism. (a) 1
- $^{\circ}$ Explain the relative reactivities of different classes of hydrogen halogenation reaction of alkanes. (q)
- Write a note on pyrolysis of alkanes taking suitable example. (c)

ot Kolbe's electrolytic method for the formation note on n-ethane. ಡ Write <u>(a</u> 4

3

- 1+3=4What will happen when n-hexane is heated with fuming nitric acid? (q)
 - Write the chemical reactions with suitable mechanism.
- Complete the following chemical reactions (mechanism not required): (g)

What is primary carbon in alkane? Give example.

(c)

(i)
$$CH_4 + 2O_2 \xrightarrow{\Delta} A + B + 804 \text{ kJ mol}^{-1}$$

 $1 \times 2 = 2$

(ii)
$$CH_3CH_2CH_3 + :CH_2 \longrightarrow C + D$$

UNIT-II

- 4 primary, secondary and tertiary alcohols giving suitable chemical equations. of (Cu/200-300 °C) dehydrogenation catalytic ಡ Explain (a) რ
- 3 What is iodoform test? Write its chemical reaction. (q)
- $1 \times 3 = 3$ Complete the following chemical reactions (mechanism not required): (c)

(ii)
$$CH_3(CH_2)_2COOC_2H_5 \xrightarrow{Na, C_2H_5OH} A$$

(iii) $2CH_3CH_2OH + 2Na \longrightarrow C + D$

H +

S

• • Complete the following reactions (mechanism not required) (*p*)

 $2 \times 3 = 6$

(i)
$$CH_3CH_2OH + Conc. H_2SO_4 \xrightarrow{\Delta}$$
?

(ii)
$$OH + O = C \longrightarrow PTs \longrightarrow ?$$

(iii)
$$\longrightarrow$$
 C-OH \xrightarrow{O} Pa \rightarrow ?

(c) Why is alcohol acidic in nature?

UNIT—III

Taking into account the chemical reaction given below, discuss in brief, unsymmetrical epoxides. Complete the following reaction with suitable mechanism the orientation of acid catalyzed ring opening in (a) ı,

2+3=5

- What is Williamson synthesis? Give suitable chemical reactions involved in it. *(q)*
- $1 \times 2 = 2$ Complete the following reactions (mechanisms not required) : (c)

(i)
$$CH_3 + HI \xrightarrow{heat} 2 + 2$$

(ii)
$$H_2C \longrightarrow CH_2 \longrightarrow C_2H_5OH/H^{\oplus} \rightarrow ?$$

Complete the following reactions with suitable mechanisms: 6. (a)

(i)
$$H_3CH_2C-O-CH_2CH_3 + O_2 \longrightarrow ?$$
 (Autooxidation of ethers)

Ph

$$(ii) O \longrightarrow + C_6H_5-Li \longrightarrow H_2O/H^{\oplus} ?$$

Write a brief note on Ziesel method for the estimation of alkoxy group (methoxy and ethoxy groups). (*q*)

3

 $1 \times 2 = 2$ Complete the following reactions (mechanisms not required) : ċ + ċ H₂SO₄, 140 °C (i) H₃C—H₂C—CH₂—OH — (c)

(ii)
$$H_2C - CH_2 \xrightarrow{NH_3} ?$$

UNIT-IV

Complete the following reactions with suitable mechanisms (any two) : 7. (a)

(i)
$$(ii) \longrightarrow H + NH_2NHCONH_2 \longrightarrow ?$$
(ii)
$$C_1 + LiAl(OCCH_3)_3H \xrightarrow{Ether, H_2O}$$
(iii)
$$C_1 + LiAl(OCCH_3)_3H \xrightarrow{O}$$

Write the IUPAC name of the following carbonyl compounds

 $1 \times 2 = 2$

Write the IUPAC name

(i)
$$H_3$$
CO

(ii) H_3 CO

(iii) H_3 CO

How will you prepare acetone from acetyl chloride? Write the chemical What is Tollens' reagent? What will happen when acetaldehyde reacts equation. 8. (a) 0

00

 \sim

1+3=4 with Tollens' reagent? Write down the chemical equation involved in it.

(b) Complete the following reactions (mechanisms not required) :
$$(i) \qquad 0 \qquad 1) CH_3Li \qquad ?$$

 $1 \times 3 = 3$

$$(ii) \quad H_3C \qquad H + \begin{pmatrix} NHNH_2 \\ H_3C \end{pmatrix} \qquad \begin{pmatrix} NHNH_2 \\ H_2 \end{pmatrix} \qquad \begin{pmatrix} NHNH_2 \\ NO_2 \end{pmatrix}$$

$$(iii) \qquad \bigcup_{\text{NaOH}} \qquad I_2 \longrightarrow ? + ?$$

(0)