2023

B.A./B.Sc.

**Third Semester** 

CORE - 6

**CHEMISTRY** 

Course Code: CHC 3.21 (Organic Chemistry - II)

Total Mark: 70 Pass Mark: 28

Time: 3 hours

Answer five questions, taking one from each unit.

#### UNIT-I

1. (a) What is Hunsdiecker reaction? Give example.

3

(b) For the reaction

$$CH_{3}-CH_{2}-$$

discuss those factors which favour and do not favour above reactions.

5

(c) Complete the following reactions:

 $1\frac{1}{2} \times 4 = 6$ 

(i) 
$$CH_3$$
— $Li + O = C = O \longrightarrow ? \xrightarrow{H_3 O^+} ? \xrightarrow{hydrolysis} ?$ 

(ii) 
$$CH_3$$
— $Li + CH_2$ — $CH_2 \rightarrow ? \xrightarrow{H_3O^+} ?$ 

(ii) 
$$CH_3$$
— $Mg$ — $I + CH_2$ 
 $O \rightarrow ? \xrightarrow{H_3O^+} ?$ 

(iv) 
$$\langle N_2^+ X^- \xrightarrow{KI} ? + ? + ?$$

- 2. (a) What is S<sub>N</sub>1-reaction? Give its mechanism and stereochemical aspects with a suitable example.
  - (b) Complete the following reaction and give their mechanisms.  $2\frac{1}{2} \times 2=5$

(i) 
$$Cl + CuCN \longrightarrow ?$$

(ii) 
$$\longrightarrow$$
  $+ NH_3 \longrightarrow ?$ 

(c) Complete the following reactions:

$$1\frac{1}{2} \times 2 = 3$$

6

(i) 
$$CH_3-Mg-Br+CO_2 \longrightarrow ? \xrightarrow{H_3O^+} ?$$

(ii) 
$$C_2H_5-Mg-I+ H$$
  $C=O \rightarrow ? \xrightarrow{H_3O^+} ?$ 

### **UNIT-II**

3. (a) Phenols are more acidic than alcohol. Justify.

 $1\frac{1}{2} \times 4 = 6$ 

- (b) Complete the following reactions:
  - (i)  $C_2H_5OH \xrightarrow{H^+/KMnO_4} ?$

(ii) 
$$CH_3 - CH = CH_2 \xrightarrow{(i)B_2H_6(ii)H_2O_2/OH} ?+?$$

(iii) 
$$\langle \bigcirc \rangle - N_2^+ Cl^- + H_2O \xrightarrow{\text{warm}} ? + ? + ?$$

(c) Discuss the following reaction of phenol:

 $2\frac{1}{2} \times 2 = 5$ 

- (i) Reimer-Tiemann reaction
- (ii) Kolbe reaction
- 4. (a) Complete the following reactions:

$$1\frac{1}{2} \times 5 = 7\frac{1}{2}$$

(i) 
$$(CH_3)_2 CH-OH \xrightarrow{Cu,400^{\circ}C} ?+?$$

(ii) 
$$(CH_3)_2 C-OH \xrightarrow{Cu,400^{\circ}C} ?+?$$

(iii) 
$$CH_3$$
— $CH$ — $CH$ — $CH_3$ — $CH_3COOCH_3$  ? —  $H_3O^+$  ?  $H_3O^$ 

(iv) 
$$CH_3$$
- $CH$ = $CH$ - $CH_3$   $\xrightarrow{HOCl}$  ?  $\xrightarrow{NaHCO_3(aq.)}$  ?

(v) 
$$CH_2 = CH_2 + \frac{1}{2}O_2 \longrightarrow ? \xrightarrow{H_2O} ?$$

- (b) What is pinacol-pinacolon rearrangement? Give its mechanism. 4
- (c) Phenols are less soluble in water than corresponding alcohol. Give reason.  $2\frac{1}{2}$

# **UNIT-III**

5. (a) Write the common, commercial and IUPAC names of the following compound.  $4\times2=8$ 

- (b) How is ether prepared by dehydration of alcohols? Give its mechanism.
- (c) Complete the following reactions:

(i) 
$$CH_3 - CH_2 - O - CH_2 - CH_3 \xrightarrow{Cl_2 \ UV-light}$$
?

(ii) 
$$CH_3-CH_2-O-CH_2-CH_3+C1 \xrightarrow{\text{dark (absence of light)}} ?$$

- 6. (a) Write two methods for the preparation of ethers.
  - (b) Write the common as well as IUPAC name of the following compounds:
    - (i) CH<sub>3</sub>-SH

(ii) C<sub>6</sub>H<sub>11</sub>SH

4

2

4

3

(c) Complete the following reactions:

$$1\times4=4$$

(i) 
$$CH_3$$
  $CH-O-CH_3 + HI \longrightarrow ?+?$ 

(ii) 
$$CH_3$$
— $C$ -O- $CH_3$  +  $HI$   $\longrightarrow$  ? + ?  $CH_3$   $CH_3$ 

(iii) 
$$CH_3 - CH_2 - Br + NaSH (excess) \longrightarrow$$

(iv) 
$$C_2H_5OH + H_2S \longrightarrow$$

(d) Complete the following reactions:

$$1\frac{1}{2}+2=3$$

(i) 
$$R$$
 C=O + CH<sub>2</sub>N<sub>2</sub>  $\longrightarrow$  ?+?

(ii) 
$$O + NH_3 \longrightarrow ?$$

# **UNIT-IV**

- 7. (a) Explain the following condensation reactions with their mechanism:
  - (i) Aldol condensation

 $4 \times 3 = 12$ 

- (ii) Benzoin condensation
- (ii) Knoevenagel condensation
- (b) Complete the reaction and write the name of the product:

$$C=O+NaHSO_3 \longrightarrow ?$$

8. (a) Complete the following reactions and give their mechanism:  $4\times3=12$ 

(i) 
$$CH_3$$
  $C=O+H_2N-OH \longrightarrow ?$ 

(ii) 
$$CH_3$$
- $CHO + Cl_2 \longrightarrow ?$ 

(iii) 
$$R$$
  $C=O+CH_3$   $CH-OH \xrightarrow{Al(OCH(CH_3)_2)_3}$ ?

(b) Complete the following reactions:

$$1 \times 2 = 2$$

(i) 
$$CH_3$$
  $C=O \xrightarrow{Zn-Hg+HCl}$  ?

$$(ii) \quad \overset{CH_3}{\underset{H}{\longleftarrow}} C = O \xrightarrow{\quad NH_2 - NH_2, KOH, glycol \quad} ?$$

### **UNIT-V**

9. (a) Complete the following reactions:

 $1\frac{1}{2} \times 6 = 9$ 

- (i)  $CH_3COO^-NH_4^+ \xrightarrow{heat} ?$
- (ii)  $CH_3COO^-NH_4^+ \xrightarrow{P_2O_5,\Delta} ?$
- (iii) R—COC1+RCOONa— $\rightarrow$ ?
- (iv)  $(RCO)_2 O + R' OH \longrightarrow ? + ?$
- (v)  $(RCO)_2 O + H C1 \longrightarrow ? + ?$
- (vi)  $(RCO)_2 O + [H] \xrightarrow{LiAlH_4} ?$
- (b) What are esters? Give the mechanism of alkaline hydrolysis of ester.

5

10. (a) Give any two methods of formation of the followings:  $2\times 2=4$ 

(i) Acid amide

- (ii) Acid chloride
- (b) Complete the following reactions:

 $2 \times 5 = 10$ 

(i) 
$$C=O+HCN \longrightarrow ? \xrightarrow{H_3O^+} ?$$

(iii) 
$$CH_3COCl + C_2H_5OH \longrightarrow ?+?$$

(iv) 
$$2CH_3COC1+(CH_3)_2Cd\longrightarrow ?+?$$

(v) 
$$CH_3COCl + H_2 \xrightarrow{Pd/BaSO_4} ?+?$$