19/6/23

R – 6212

Reg. No. : ....

Name : ....

First Semester M.Sc. Degree Examination, May 2023

Chemistry/Polymer Chemistry/Analytical Chemistry

CH 212/CL 212/PC 212 : ORGANIC CHEMISTRY – I

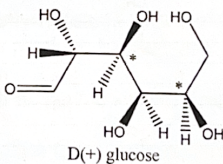**(2020 Admission Onwards)**

Time : 3 Hours   Max. Marks : 75
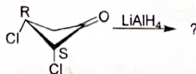
SECTION – A

Answer **two** among (a), (b) and (c) from **each** question. Each subquestion carries **2** marks.

1. (a) Determine the stereochemistry (R or S) for (*) marked stereogenic centres of the D(+) glucose molecules.


D(+) glucose

    (b) Define homotopic ligands.

    (c) Write the product of the reduction of (2S,3R)-2,3-dichlorocyclobutanone with LiA1H$_4$ by attack from the Re face side.

2. (a) Draw the structure of triphenylmethyl radical dimer in benzene.

   (b) Write the reaction of phenylacetylene molecules in presence of copper(II)acetate in pyridine solution.

   (c) Write the Hunsdiecker reaction by taking silver propionate as example.
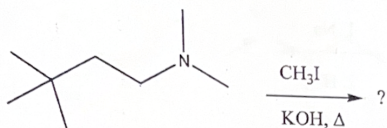
3. (a) complete the following reaction.
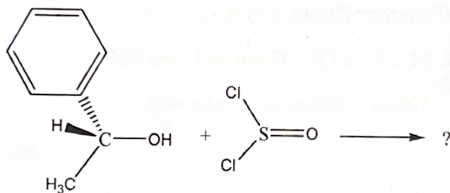
   (b) Write the mechanism of S_N2' reaction.

   (c) Arrange the following carbocations in decreasing order of their stability.
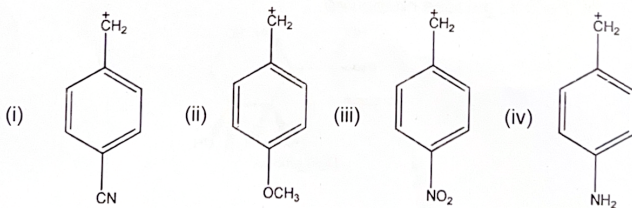
4. (a) Why are *syn*-additions taking place when the addition of hydrogen halide to conjugated alkenes with aromatic unit?

   (b) Write Cannizzaro reaction.

   (c) State the iodo lactonisation with example.

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5. (a) Write the mechanism of E1 reaction.

(b) Complete the following reaction.

$$\xrightarrow[\text{KOH}, \Delta]{\text{CH}_3\text{I}} \quad ?$$

(c) Complete the following reaction.

$$\xrightarrow[\text{C}_2\text{H}_5\text{OH}]{\text{Na, NH}_3} \quad ?$$
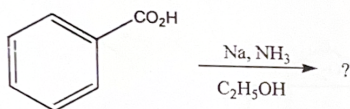
SECTION – B

(10 × 2 = 20 Marks)

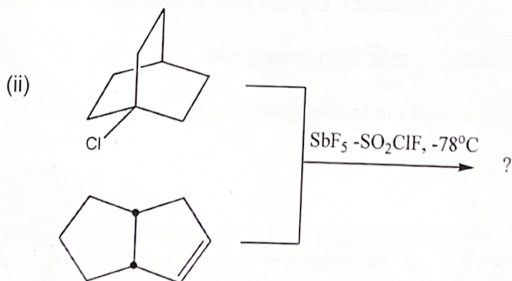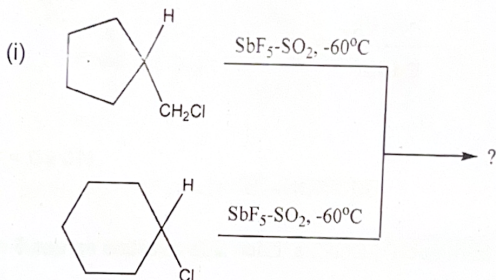Answer either **(a)** or **(b)** from **each** questions. Each Sub question carries **5** marks.

6. (a) α–phenylpropionaldehyde reacts with methyl magnesium bromide. Predict the more predominant product. Explain your answer based on Cram's rule.

(b) Explain the octant and axial halo ketone rule.

7. (a) Predict the products of the following reactions.

$$\xrightarrow[\text{2. diazotization}]{\text{1. reduction}}$$

$$\xrightarrow[\text{2. heat}]{\text{1. Cu}} \quad \text{B}$$

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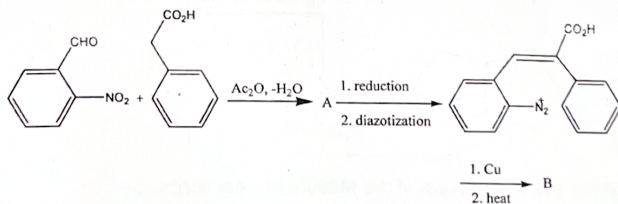
(b) Identify the product of the following reaction and write the mechanism of the reaction.

$$2 \quad \text{CH}_3\text{CH}_2\text{CH}_2\text{C(=O)OEt} \xrightarrow[\text{2. H}^+]{\text{1. Na}} ?$$
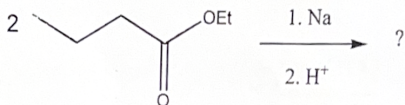
8. (a) Find the product of the following protonation and ionization reaction in super acid medium.

(i)

$$\xrightarrow{\text{SbF}_5\text{-SO}_2, -60°\text{C}}$$

$$\xrightarrow{\text{SbF}_5\text{-SO}_2, -60°\text{C}} ?$$

(ii)

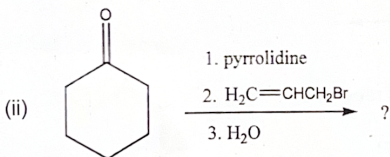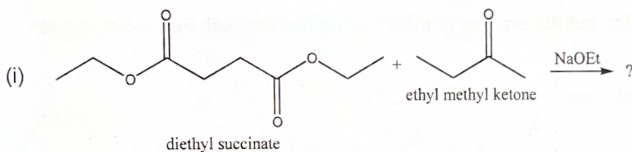$$\xrightarrow{\text{SbF}_5\text{-SO}_2\text{CIF}, -78°\text{C}} ?$$

(b) Write the mechanism of the Mitsunobu reaction.

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9. (a) (i) Explain the conjugate addition reaction with example.

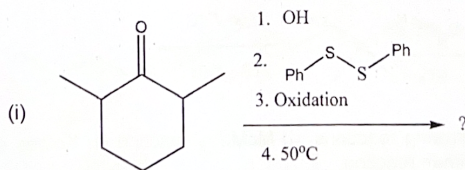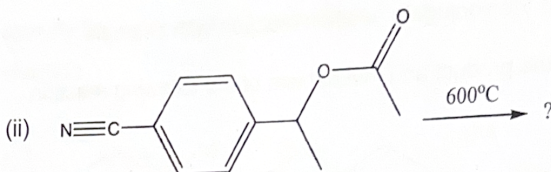   (ii) Write the product and mechanism of the following reaction.

   + DMF ⟶ ?

(b) Complete the following reactions.

   (i)

   diethyl succinate

   + ethyl methyl ketone $\xrightarrow{\text{NaOEt}}$?

   (ii)

   1. pyrrolidine
   2. $H_2C = CHCH_2Br$
   3. H_2O
   ⟶ ?
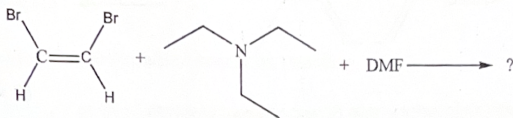
10. (a) Explain the β–elimination via cyclic transition state of Cope and Xanthate ester pyrolyses.

    (b) Write the product of the following reactions.

    (i)

    1. OH
    2. $\underset{Ph}{} S \underset{S}{} Ph$
    3. Oxidation
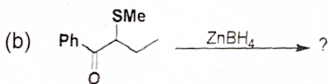   4. 50°C
    ⟶ ?

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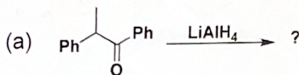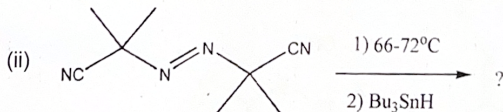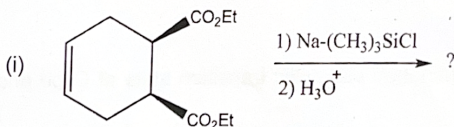R – 6212

(ii)

$600^{\circ}C$ → ?

(5 × 5 = 25 Marks)

SECTION – C

Answer any **three** questions. **Each** question carries **10** marks.

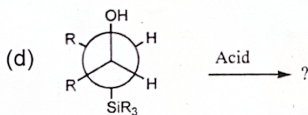11. Find out the product of the following reaction with Felkin-Anh model.

(a)

$LiAlH_4$ → ?

(b)

$ZnBH_4$ → ?

12. (a) Complete the following reactions.
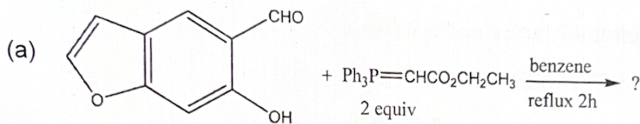
(i)

1) Na-$(CH_3)_3$SiCl
2) H_3O^+
→ ?

(ii)

1) 66-72°C
2) Bu$_3$SnH
→ ?

(b) Explain the following reactions. (i) McMurry reaction (ii) Kolbes electrolytic reaction (iii) Ullman reaction.

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13. How do solvent and structure of substrate effect on the rate of S_N1 and S_N2 reactions? Explain.

14. (a) Explain the normal, crossed and directed Aldol condensation reactions with examples.

    (b) Describe the Robinson Annulation reaction.

15. Find the product of the following reactions with stereochemistry point of view.

(a)

$+ \ Ph_3P{=}CHCO_2CH_2CH_3$
2 equiv

$\xrightarrow[\text{reflux 2h}]{\text{benzene}}$?

(b)

$-CHO \ + \ (C_2H_5O)_2\overset{O}{\overset{\|}{P}}CH_2C_6H_5 \ \xrightarrow[\text{DME}]{\text{NaH}}$?

(c)

$\xrightarrow{H_2SO_4}$?

(d)

$\xrightarrow{\text{Acid}}$?

(e)

$\xrightarrow[\text{t-BuOH}]{Na, \ NH_3(l)}$?

(3 × 10 = 30 Marks)