

Unique Paper Code	:32171302
Name of the Paper	: Chemistry C-VI Organic Chemistry- II: Oxygen Containing Functional Groups
Name of the Course	:B.Sc. (H) Chemistry
Semester	:III
Duration	:3 hours
Maximum Marks	:75

Instructions for Candidates:

- (i) Attempt four questions in all. **Question No. 1 is compulsory.**
- (ii) Give reactions wherever possible clearly indicating the reagent(s) involved.

1. (15,6)

(a) An organic compound **A** having molecular formula C_4H_8O on treatment with CF_3COOOH gives compound **B** ($C_4H_8O_2$). Two moles of Compound **B** undergo self-condensation in the presence of sodium ethoxide in ethanol gives compound **C** ($C_6H_{10}O_3$). When compound **C** is reacted with one mole of methyl bromide in the presence of sodium ethoxide in ethanol gives compound **D** ($C_7H_{12}O_3$). Compound **D** on treatment with dil. aq. KOH solution that is followed by acidification gives compound **E** ($C_5H_8O_3$), which gives positive bicarbonate test. Compound **E**, when heated gives compound **A**. Compound **A** gives negative Fehling's/Tollen's test and positive iodoform test. Deduce the structure of compounds **A-E**, write the name of the reaction involved (*if any*). Write the mechanism of the any one of the following steps:

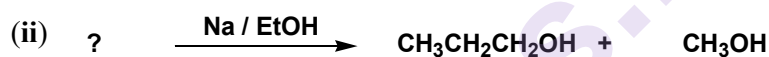
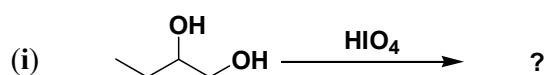
- (i) Conversion of **A** to **B**
- (ii) Conversion of **B** to **C**

(b) Write the products and give the mechanism of the reaction when benzaldehyde is treated with:

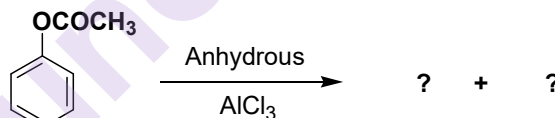
- (i) Aqueous ethanolic KCN solution
- (ii) Hydroxylamine hydrochloride in the presence of sodium acetate

2. (3,3,3,3,3)

- (a) Compare the acidic strength of phenol with that of *p*-nitrophenol.
- (b) Write the equation involved and the product formed when 3,3-dimethylbut-1-ene is subjected to oxymercuration-reduction reaction. Mention the reagent used stepwise and comment on the regioselectivity of the reaction.
- (c) Suggest a chemical test to distinguish between propan-1-ol and propan-2-ol. Write the equation involved.
- (d) Complete the following reactions:



- (e) The given phenyl ester undergoes rearrangement upon treatment with anhydrous AlCl_3 to give two isomeric products.

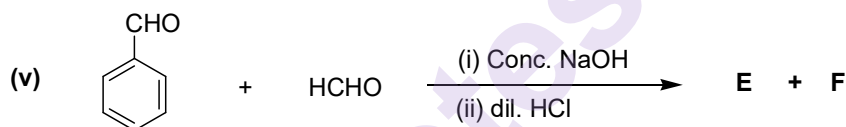
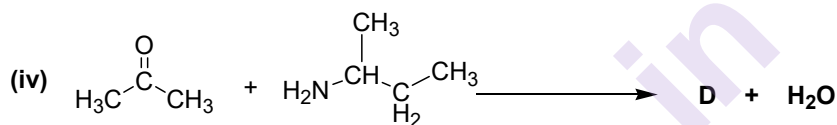
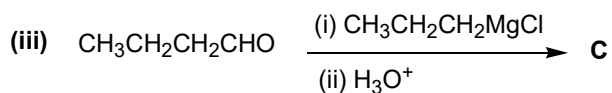
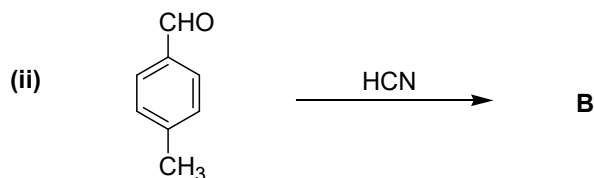
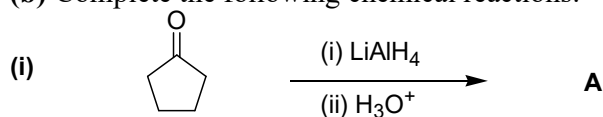


- (i) Write the structure of possible products.
- (ii) Suggest a reaction condition to favor the formation of either of the two products.

3. (6,6,3,3)

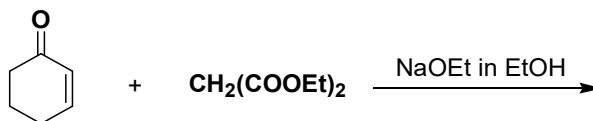
- (a) Using ethyl acetoacetate **or** diethyl malonate, outline the method of synthesis for any three of the followings:
- (i) 3-Methylhexan-2-one
- (ii) α -Methyl succinic acid
- (iii) Adipic acid
- (iv) Veronal or Barbital

(b) Complete the following chemical reactions:



(c) Suggest a method for the synthesis of cinnamic acid using benzaldehyde. Name the reaction involved.

(d) For the reaction given below, give the product formed while briefly discussing the mechanism involved.



4.

(a) How will you distinguish between the following pair of molecules with suitable reactions. (attempt any three) (2x3)

(i) β - and γ -hydroxy carboxylic acids

(ii) Benzoic acid and cyclohexanone

(iii) Ethanal and propanal

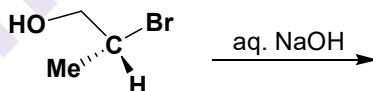
(iv) Phenol and benzoic acid

(b) Carry out the following conversions: (3x4)

- (i) Propanoic acid to propanal
- (ii) Acetic acid to 2-hexanone
- (iii) Chlorobenzene to aniline
- (iv) *n*-Propanol to butanamide

5. (3x6)

- (a) What are ambident nucleophiles? How will you convert alkyl halides into nitro alkane and alkyl nitrite ? Explain.
- (b) S_N2 reactions involve complete inversion of configuration. Explain.
- (c) Why 2,4,6-trinitrochlorobenzene is easily hydrolyzed in the presence of aq. NaOH solution but not chlorobenzene ?
- (d) Why salicylic acid is stronger acid than *p*-hydroxybenzoic acid ?
- (e) What product is formed when 2-phenyl-1-ethanal is treated with dil. aqueous NaOH solution ?
- (f) Why the substitution of bromine in the following reaction proceeds with retention of configuration ? Explain.



6. Write a short note on any three of the followings: (6x3)

- (a) Claisen rearrangement
- (b) Wittig reaction
- (c) Beckmann rearrangement
- (d) S_N1 mechanism
- (e) Benzyne mechanism