

- N.B :** 1. All questions are **compulsory**.
2. **Figures** to the **right** indicate **full marks**.

1. Answer **any five** of the following :—

20

- Explain the molecular chirality of alkylidene - cycloalkanes.
- Give an account of benzyne mechanism.
- Differentiate between basicity and nucleophilicity.
- Give an account of Stobbe condensation.
- Complete the reaction and give its mechanism.

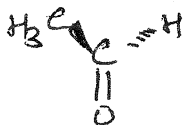


- What is the Friedel - Craft Acylation reaction ? Give its mechanism.
- Write a note on McLafferty rearrangement.
- Explain spin-spin coupling in NMR spectroscopy.

2. (a) Explain in detail the $A_{Ac}1$ mechanism of ester hydrolysis. Explain the evidence for determining the mechanism. 7

OR

- Explain with an example the stereochemistry involved in biphenyls. Explain the stereochemical descriptors of these compounds with suitable examples. 7
- Show the R_e and S_i faces of the following compound : 6



Give the product obtained when the R_e face is treated with HCN.

- (i) Compare the basicity and nucleophilicity of the following compounds : 7
A) t - butoxide ion and hydroxide ion.
- (ii) Why are phenols less acidic than carboxylic acids ?

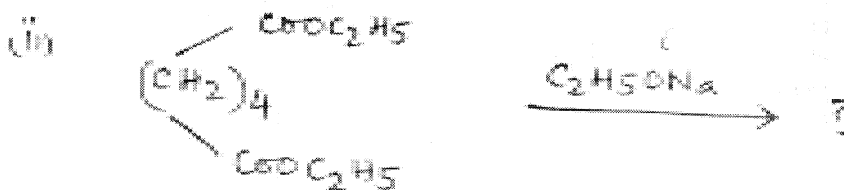
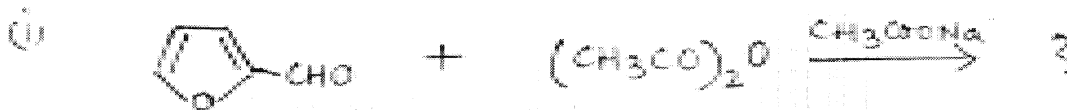
OR

- Explain the following : 7
 - Ion-pair effect
 - Walden inversion

[TURN OVER

3. (a) Complete the following reactions, name them and give the mechanism of **any one**:

7



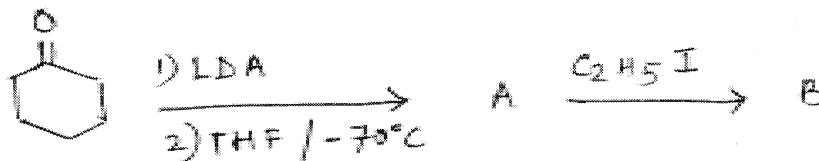
OR

- (a) (i) Write a short note on Robinson annulation.

4

- (ii) Complete the following reaction and justify the products :

3



- (b) Write short notes on :

6

(i) Vilsmeier - Haack reaction

(ii) Reformatsky reaction

- (c) Write short note on :

7

(i) Favorskii rearrangement

(ii) Michael addition

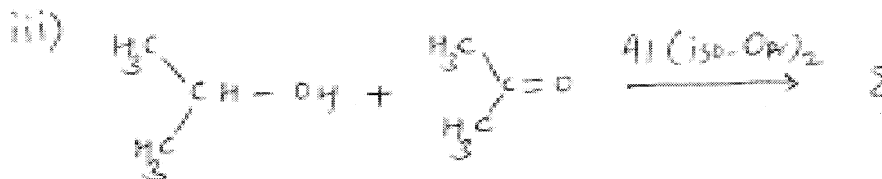
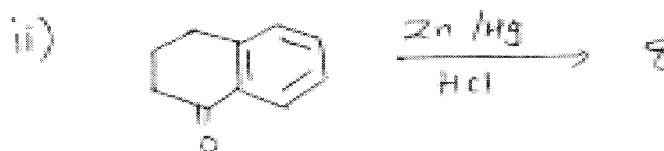
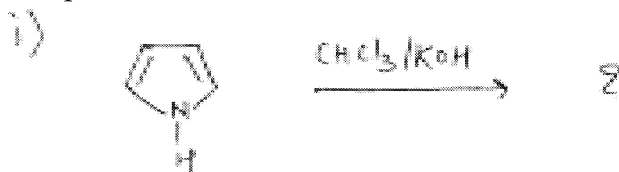
OR

- (c) Using a suitable example, explain the mechanism of Mannich reaction.

7

4. (a) Predict the product and name the reaction :

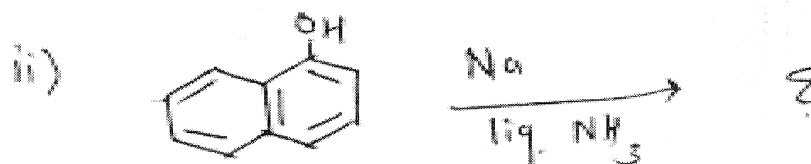
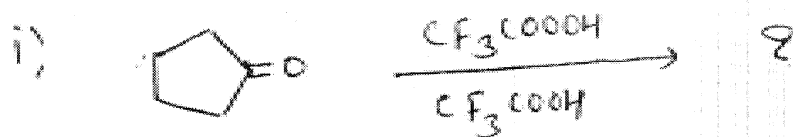
7



OR

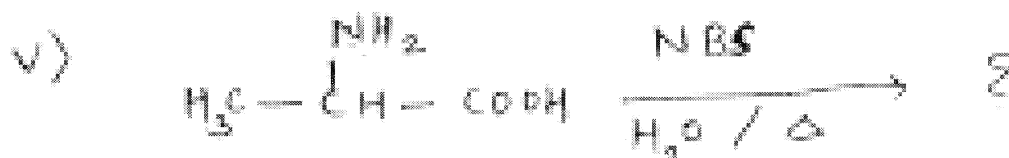
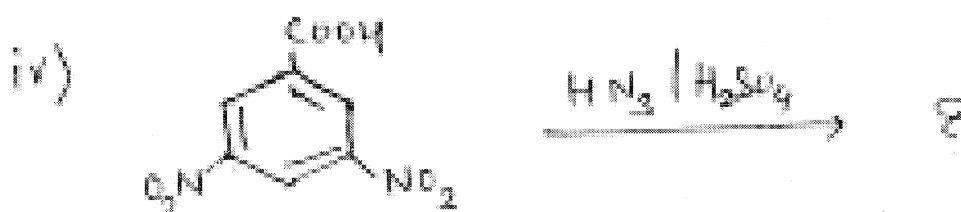
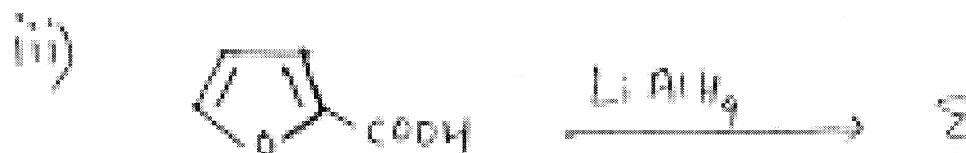
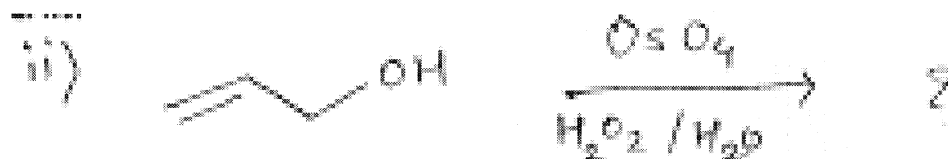
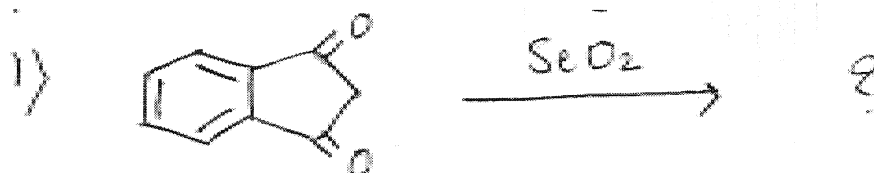
(a) Complete the following and give the mechanism involved of **any one** :

7



(b) Complete the following reactions :

6



[TURN OVER

- (c) Give any two applications of NaBH_4 reagent and give the mechanism of **any one** of them. 7

OR

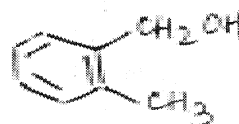
- (c) (i) Give the synthetic applications of MnO_2 reagent.
(ii) Discuss the mechanism of Fries rearrangement. 7

5. (a) Give the mass fragmentation patterns of the following molecules : 7

(i)



(ii)



OR

- (a) On the basis of NMR spectroscopy, how will you distinguish between : 7

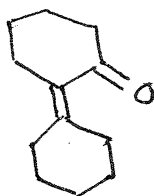
- (i) Equatorial and axial protons in cyclohexane
(ii) Inter and intramolecular hydrogen bonding.

- (b) (i) How will you distinguish between the following pairs of compounds on the basis of IR spectroscopy : 4

(X) CH_3CONH_2 and $\text{CH}_3\text{CH}_2\text{NH}_2$

(Y) Alkenes and alkynes

- (ii) Calculate λ_{max} for the following compound : 2



- (c) From the data given below, deduce a possible structure for 'A' having molecular formula $\text{C}_8\text{H}_{14}\text{O}_3$: 7

IR (cm^{-1}) = 2950, 1735, 1717

NMR (δ) = 1.3 ppm (9H, s); 2.0 ppm (3H, s); 3.1 ppm (2H, s)

Mass spectra : M^+ 158 less < 1%, m/z 85, m/z 57 (base peak), m/z 43

OR

- (c) Explain magnetic anisotropy in NMR spectroscopy with respect to the following protons : 7

- (i) Acetylenic protons
(ii) Aromatic protons.