

QP Code : 76078

(3 Hours)

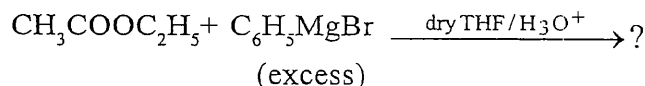
[Total Marks : 100

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

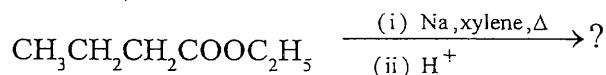
1. Attempt **any five** of the following :

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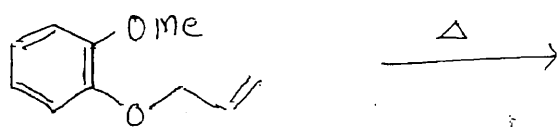
- (a) Explain:
(i) t-butoxide ion is a strong base but a weaker nucleophile than hydroxide ion.
(ii) Vinyl halides do not undergo S_N1 and S_N2 reactions.
(b) The pKa value of o-hydroxy benzoic acid is lower than the meta and para isomer. Explain.
(c) Predict the product and give the mechanism :-



- (d) Complete the reaction and give the mechanism:



- (e) Complete the reaction and give its mechanism:



- (f) What is Friedel Craft acylation? Give the mechanism of the reaction
(g) Write a note on Retro Diels Alder reaction.
(h) How will you distinguish between cis and trans alkene on the basis of NMR spectroscopy?

2. (a) Answer the following :-

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- (i) Explain the mechanism and stereochemistry of S_N1 reactions.
(ii) What are ambident nucleophiles? Give two examples.

OR

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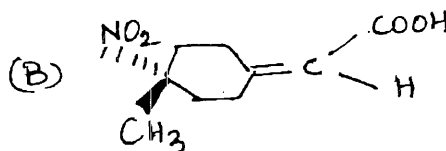
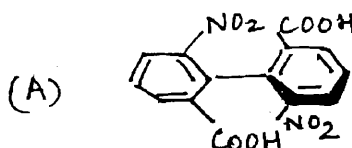
- (a) Show the R_e and S_i faces of the following compound. Give the product obtained when the S_i face of the compound is treated with HCN. 7



- (b) How is the mechanistic pathway of ester hydrolysis determined by isotopic labelling? Explain in detail, the A_{AC2} mechanism of ester hydrolysis. 6
- (c) Give an account of stereochemistry of ansa compounds. Give a methodology for assigning stereochemical descriptors to these compounds. Explain with examples. 7

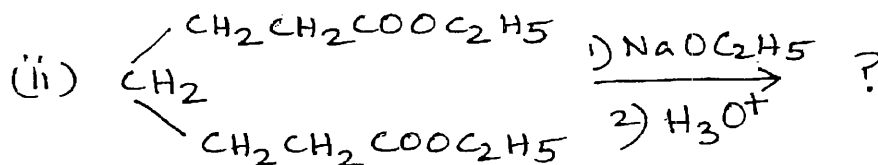
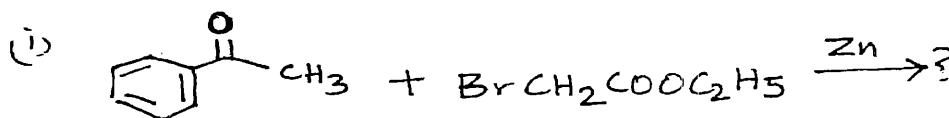
OR

- (c) Assign configurational descriptors to the following compounds : 7



To which class of compounds does (A) and (B) belong?
Discuss the stereochemistry of any one of the above.

3. (a) Complete the following reactions and give their mechanism : 7



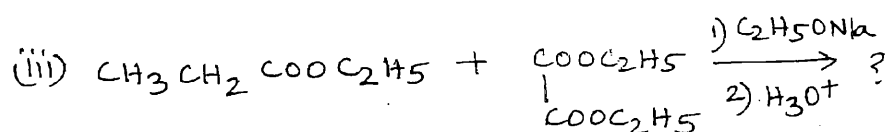
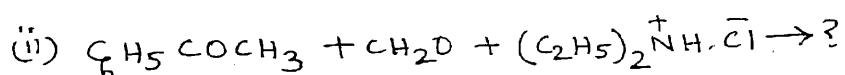
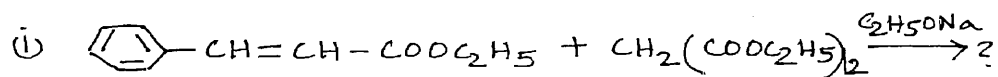
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- (a) Explain kinetic and thermodynamic control in alkylation reaction of an unsymmetrical ketone using a suitable base. 7

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(b) Complete and name the following reactions :

6



(c) Give the mechanism and one application of Mc Murry's coupling reaction.

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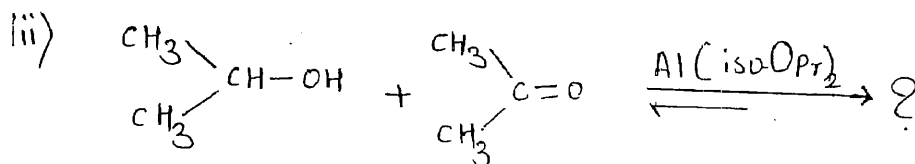
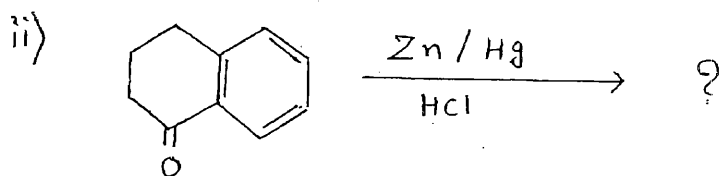
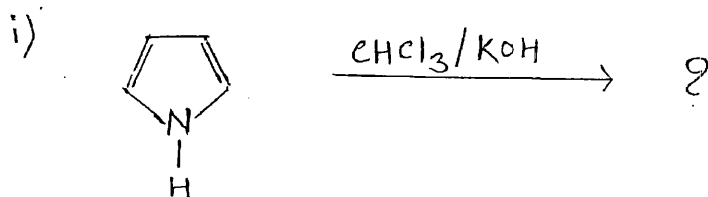
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(c) Give the mechanism and one application of Perkin reaction.

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

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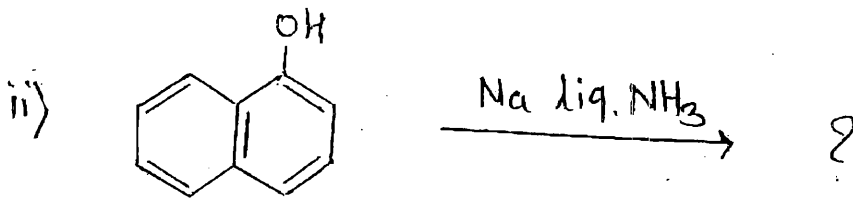
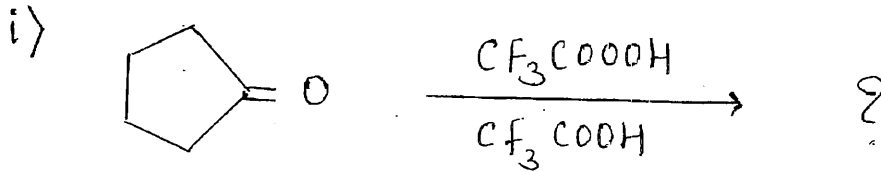


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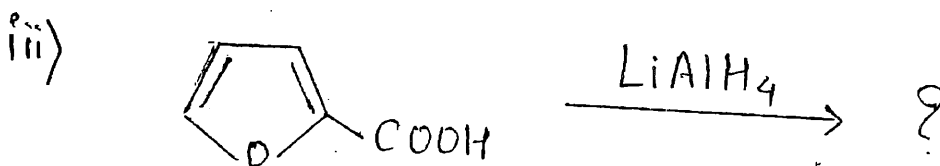
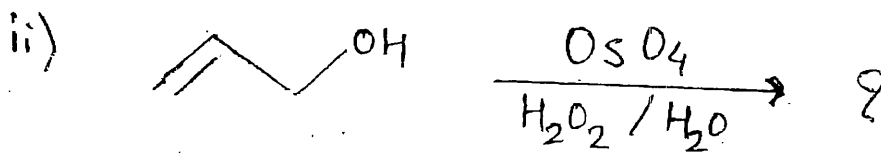
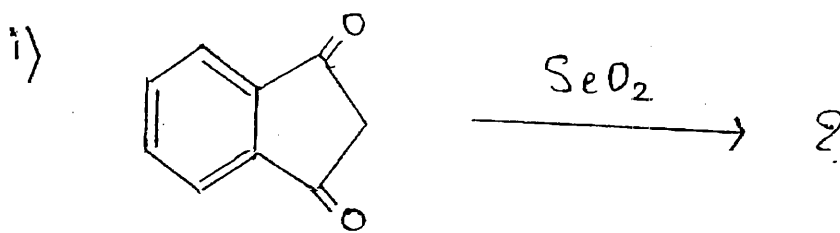
(a) Complete the following and give the mechanism involved :-

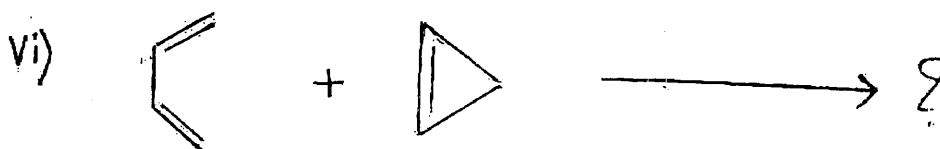
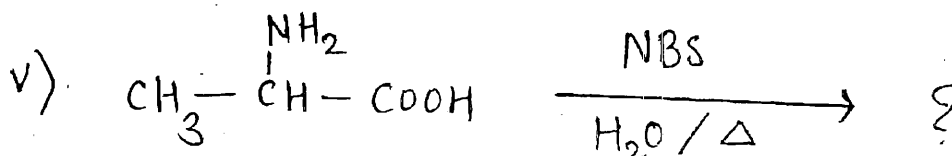
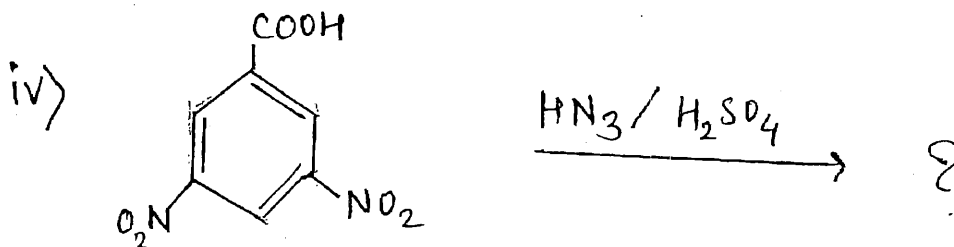
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(b) Complete the following reactions :-

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

OR

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

5. (a) What is meant by the term 'Chemical shift'? Discuss the factors affecting chemical shift. 7

OR

- (a) (i) Explain McLafferty rearrangement in mass spectrometry. 7
 (ii) Give the fragmentation pattern of benzoic acid.

- (b) An organic compound having molecular formula $\text{C}_4\text{H}_5\text{NO}_2$ shows following spectral data :- 6

IR (cm^{-1}) : 2250(m), 1740 (s)

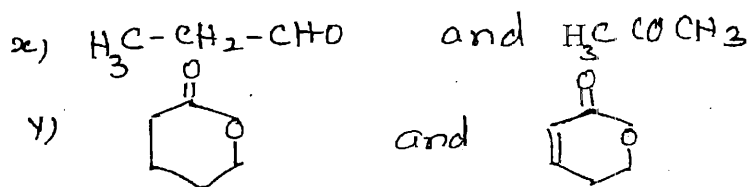
PMR (δ ppm) : 3.8 (3H, singlet), 3.5 (2H, singlet)

Mass spectrum (m/z) : 99, 73, 59

Deduce the structure of the compound.

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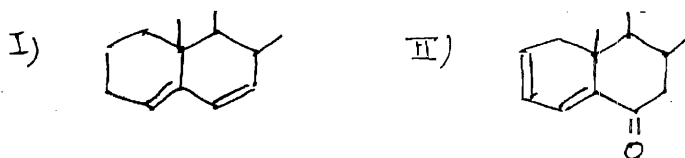
(c) (i) How will you distinguish between the following pairs on the basis of IR spectroscopy? 7



(ii) Explain finger print region in IR spectroscopy.

OR

(c) (i) Calculate λ_{max} for the following : 7



(ii) What is bathochromic shift and hypsochromic shift?
