

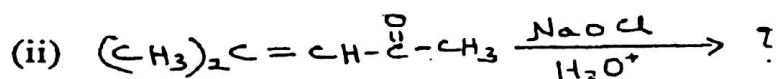
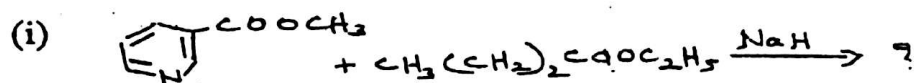
(2½ Hours)

[Total Marks : 60

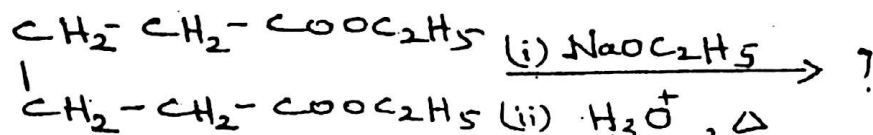
- N.B. : (1) All questions are compulsory.
(2) Figures to the right indicate full marks.

1. (A) Answer any two of the following :

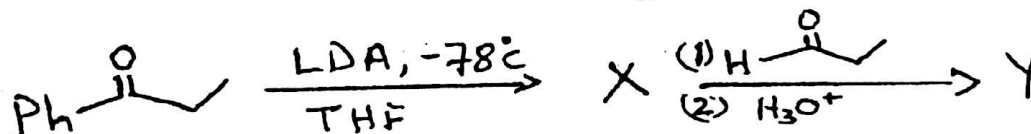
- (a) What is Hell-Volhard-Zelinsky reaction ? Give its mechanism with a suitable example. 4
(b) Predict the product and name the following reactions : 4



- (c) Complete the following reaction, name it and explain its mechanism 4



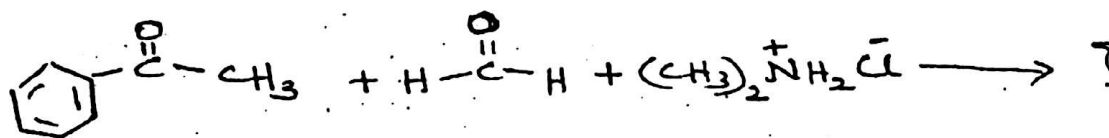
- (d) (i) Give the structure of X and Y under the given reaction conditions :



- (ii) Give a complete reaction to represent acylation of enolate ions.

(B) Answer any one of the following :

- (a) Discuss Michael addition with mechanism 4
(b) Complete the following reaction and explain its mechanism. 4



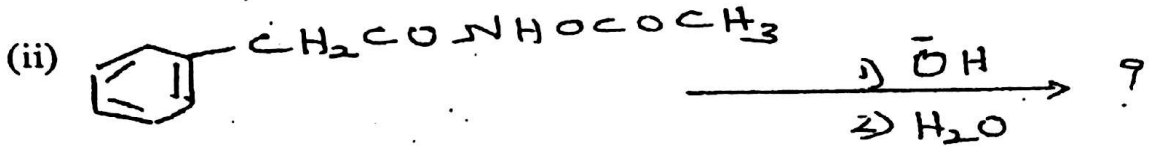
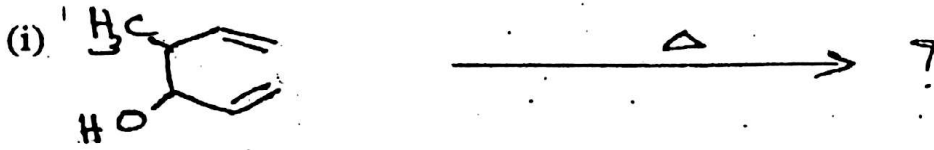
2. (A) Answer any two of the following :

- (a) What is Schmidt rearrangement ? Explain its mechanism. 4

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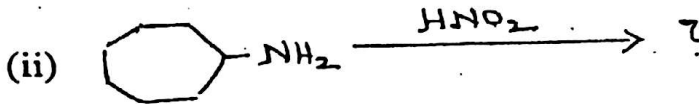
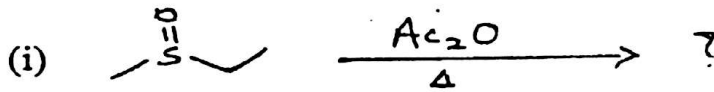
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(b) Name the following reactions and write the structure of the products. 4



(c) What is Favorskii rearrangement? Give its mechanism. 4

(d) Complete the following reactions and name them. 4

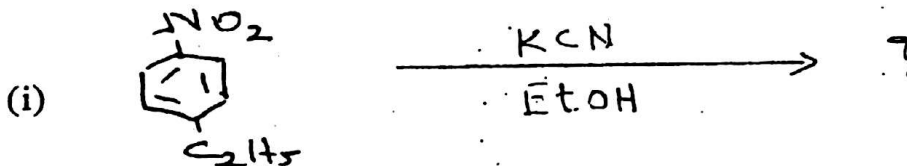


(B) Answer any one of the following :-

(a) What is olefin metathesis? Give one example for each of the following. 4

(i) cross metathesis (ii) ring closing metathesis

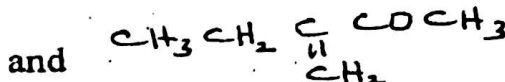
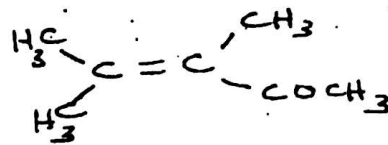
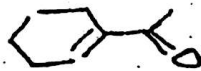
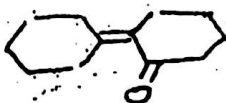
(b) Predict the products and name the following reactions. 4



3. (A) Answer any two of the following :

(a) Match the following and explain :-

Compounds :



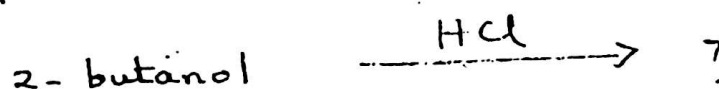
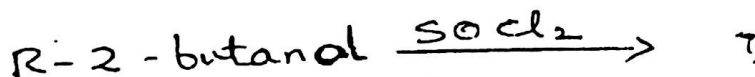
λ_{max} (nm) :- 221, 249, 233 and 258

(Note : Increments for alkyl substituents on enone chromophore :-
 $\alpha = 10 \text{ nm}$, $\beta = 12 \text{ nm}$, γ and higher = 18 nm)

(b) Explain the following in IR spectroscopy with suitable examples

- (i) vibrational coupling
- (ii) study of hydrogen bonding

(c) Complete the following reactions with mechanism :

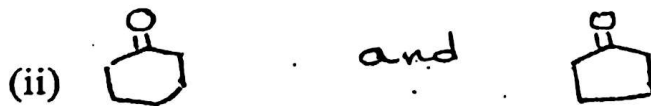


(d) Explain the following :

- (i) Comparative nucleophilicity of ethoxide and t-butoxide ions.
- (ii) Comparative reactivity of 1-chloropropene and 3-chloropropene to $\text{S}_{\text{N}}1$ reactions.

(B) Answer any one of the following :

(a) Which of the following compounds will show a lower $\text{C}=\text{O}$ stretching frequency in IR spectroscopy and why ?



(b) 2, 4, 6 - Trinitrochlorobenzene undergoes hydrolysis easily in hot water. Explain based on the mechanism of the reaction.

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4. (A) Answer any two of the following :

- (a) (i) What is vicinal coupling in NMR spectroscopy ? Mention two factors that affect the vicinal coupling constant. 4
 (ii) Explain the term 'long range coupling' with an example. 4
 (b) On the basis of NMR spectroscopy how will you distinguish between : 4
 (i) cis and trans stilbene ?
 (ii) inter and intramolecular hydrogen bonding ?
 (c) Explain the fragmentation pattern of the following in mass spectrometry : 4
 (i) pentanal
 (ii) n-butylbenzene
 (d) Explain the following in mass spectrometry : 4
 (i) Base peak
 (ii) Nitrogen rule

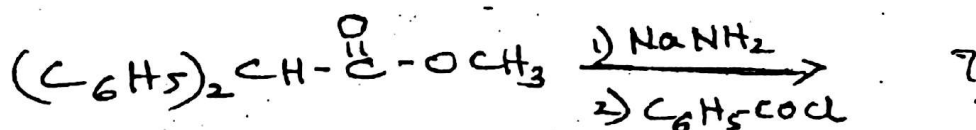
(B) Answer any one of the following :

- (a) A compound with molecular formula $C_9H_{10}O_2$ shows following spectral data : 4
 IR (cm^{-1}) : 1740 (s), 1220 (s), 750 (m), 700 (m)
 PMR δ (ppm) : 1.96 (s, 3H), 5.0 (s, 2H), 7.2 (m, 5H)
 m/z : 91, 65, 43
 Deduce the structure of compound.
 (b) Explain the following in mass spectrometry 4
 (i) retro Diels Alder reaction
 (ii) ortho effect.

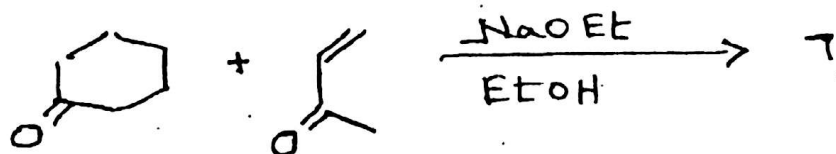
5. Answer any four of the following :

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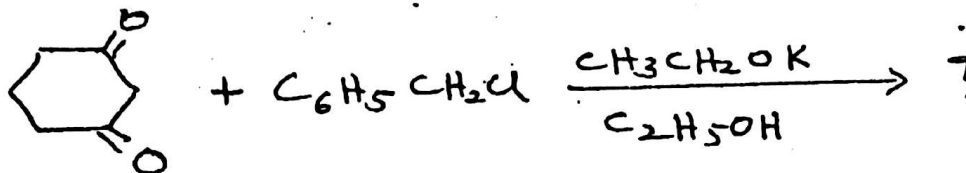
(A) Predict the product and write the mechanism of the following reaction :



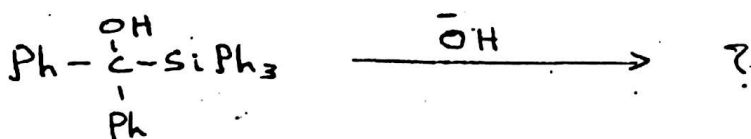
(B) (a) Complete the following reaction and name it



(b) Predict the product of the following reaction :



- (C) Give the mechanism of Dienone-phenol rearrangement
 (D) Suggest the mechanism of the following reaction.



- (E) The $n \rightarrow \pi^*$ transition of acetone appears at 279nm in hexane and at 264 nm in water. Explain.
 (F) Explain the B_{AC}^2 mechanism of ester hydrolysis.
 (G) Explain the magnetic anisotropy of carbonyl group.
 (H) What is the most characteristic feature of the mass spectra of compounds containing one bromine atom ?