

[Time: 2.30 Hours]

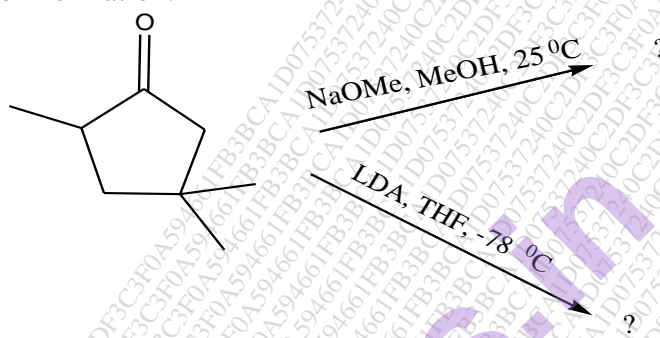
[Total Marks: 60]

Please check whether you have got the right question paper.

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

Q.1(A) Attempt any **two** of the following :

- (a) What is Hell-Volhard-Zelinsky reaction? Give its mechanism with suitable example. **4**
(b) What is major enolate formed in each of the following condition? Explain their formation. **4**

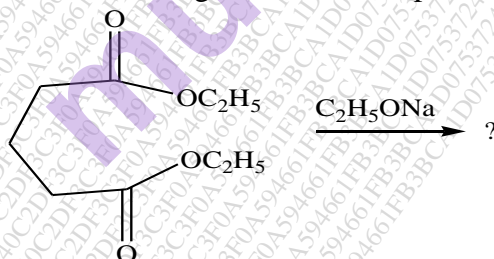


- (c) What is Mannich reaction? Explain its mechanism with suitable example. **4**
(d) Complete the following reaction and give the mechanism involved. **4**

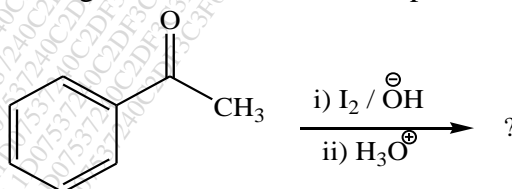


(B) Attempt any **one** of the following:

- (a) Complete the following reaction and explain its mechanism. **4**



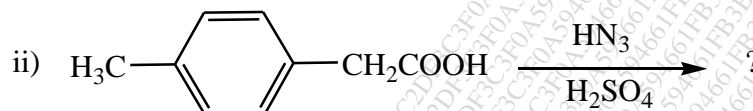
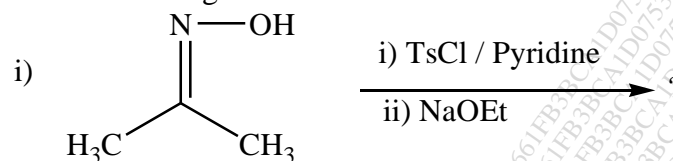
- (b) Complete the following reaction, name it and explain its mechanism. **4**



Q.2(A) Attempt any **two** of the following :

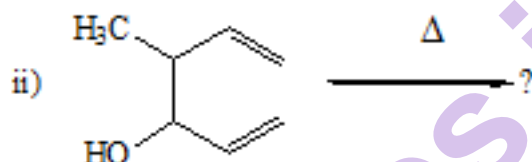
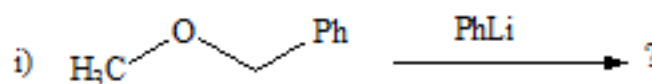
(a) Explain Von Richter rearrangement with its mechanism. 4

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



(c) What is Curtius rearrangement? Explain its mechanism. 4

(d) Predict the product and name the following reactions. 4



(B) Attempt any **one** of the following:

(a) Give the mechanism for following conversion. 4

i) α -diazoketone \longrightarrow ketene

ii) O -acylhydroxamic acid \longrightarrow isocyanate

(b) Explain Dienone-Phenol rearrangement with suitable example. Explain its mechanism. 4

Q.3(A) Attempt any **two** of the following :

(a) Explain the following mechanisms with suitable examples 4

i) $\text{S}_{\text{N}}\text{C}$ ii) $\text{S}_{\text{N}}2'$

(b) Explain the following:- 4

i) NGP of aryl rings in nucleophilic substitution reaction

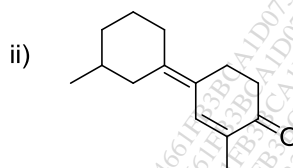
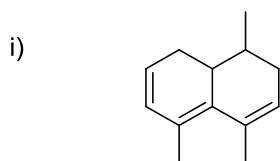
ii) Overtone and combination bands in IR spectra.

(c) Explain $\text{n} \longrightarrow \pi^*$ transition of acetone appears at 279 nm in hexane and 264 nm in water. 4

(d) Explain Aromatic nucleophilic substitution reaction with the help of benzyne mechanisms. 4

- (B) Attempt any **one** of the following:
 (a) Calculate the λ_{max} of the following compounds

4



[Note: Increments for alkyl substituents on enonechromophore $\alpha = 10$ nm, $\beta = 12$ nm and higher = 18 nm]

- (b) Explain in the following :
 i) Vibrational coupling
 ii) Bathochromic effect and hypsochromic effect

4

Q.4(A) Attempt any **two** of the following :

- (a) a) An Organic Compound having M.F. $\text{C}_5\text{H}_{11}\text{ON}$ showed following spectral data:

4

I.R. = 3500 cm^{-1} , 2970 cm^{-1} , 1690 cm^{-1} .

$^1\text{H-NMR}$ = δ 0.9 (6H, d), δ 1.3 (1H, m), δ 2.4 (2H, d) and δ 3.0 (2H, bs, exchange with D_2O). Deduce the structure of the compound and justify your answer.

- (b) Explain the following in Mass spectroscopy with one example each.

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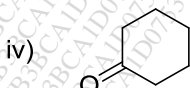
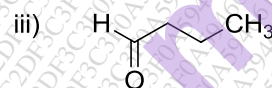
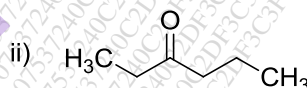
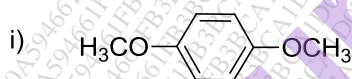
- i) Ortho effect ii) Nitrogen rule

- (c) How will you distinguish between 2-pentanone and 3-pentanone by Mass spectroscopy?

4

- (d) Write the number of signals and splitting pattern observed in the NMR spectra of following molecules:

4



- (B) Attempt any **one** of the following:

- (a) Write the fragmentation pattern of the following molecules in Mass spectroscopy.

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- i) Benzyl alcohol ii) 2-butanone

- (b) An Organic Compound having M.F. $\text{C}_{10}\text{H}_{12}\text{O}_2$ showed following spectral data:

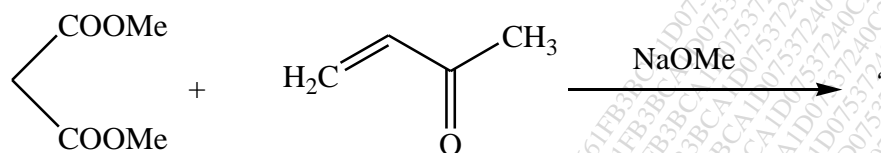
4

I.R. = 3090 cm^{-1} , 2970 cm^{-1} , 1735 cm^{-1} , 1250 cm^{-1} .

$^1\text{H-NMR}$ = δ 0.9 (3H, t, $J = 6.5\text{ Hz}$), δ 4.3 (2H, q, $J = 6.5\text{ Hz}$), δ 7.2 (2H, d, 7.5 Hz), δ 7.7 (2H, d, $J = 7.5\text{ Hz}$) and δ 2.3 (3H, s). Deduce the structure of the compound and justify your answer.

Q.5 Attempt any **four** of the following :

A Complete the following reaction, name it and explain the mechanism. 3

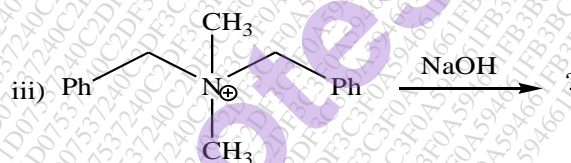
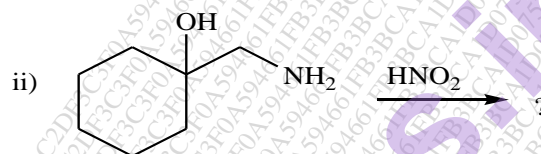


B Complete the following reaction and explain its mechanism. 3



C Explain Brook rearrangement with its mechanism. 3

D Complete the following reactions. 3



E Give the mechanism of ester hydrolysis via tetrahedral intermediate. 3

F Which of the two molecules 1, 3 butadiene or ethene will have a greater λ_{max} value and why? 3

G Explain the term chemical shift and write the chemical shift values for carboxylic acid. 3

H Explain the term Metastable ion peak and Base peak in Mass Spectroscopy. 3