[Time: 2.30 Hours] **[Total Marks: 60]**

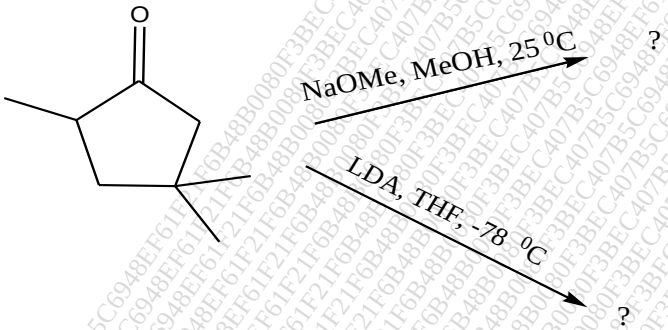
Please check whether you have got the right question paper.

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

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

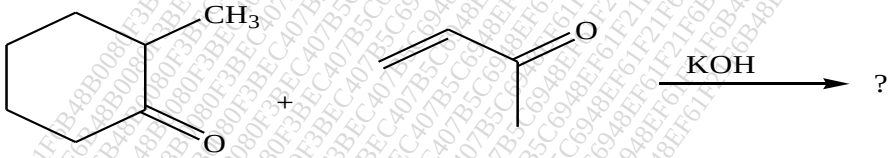
(a) What is Hell-Volhard-Zelinsky reaction? Give its mechanism with suitable example. **4**

(b) What is major enolate formed in each of the following condition? Explain their formation. **4**



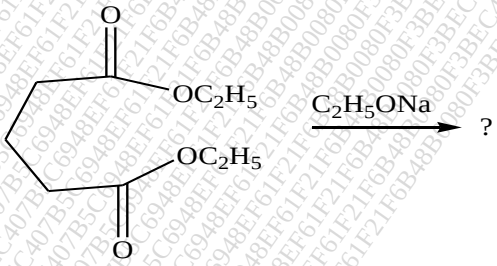
(c) What is Mannich reaction? Explain its mechanism with suitable example. **4**

(d) Complete the following reaction and give the mechanism involved. **4**

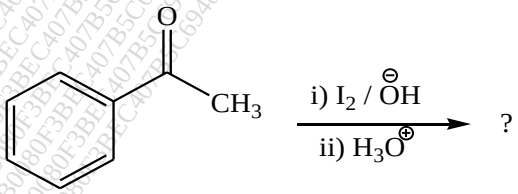


(B) Attempt any **one** of the following:

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



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

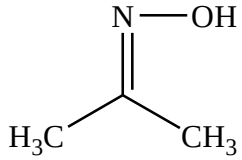


Q.2(A) Attempt any **two** of the following :

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

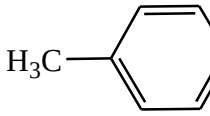
(b) Complete the following reactions and name them. **4**

i)



i) TsCl / Pyridine
ii) NaOEt
→ ?

ii)

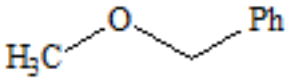


HN_3
H_2SO_4
→ ?

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

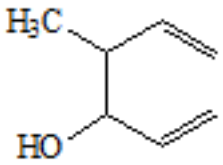
(d) Predict the product and name the following reactions. **4**

i)



PhLi → ?

ii)



Δ → ?

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

(a) Give the mechanism for following conversion. **4**

i) α-diazoketone ⟶ ketene

ii) O -acylhydroxamic acid ⟶ isocynate

(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) **SNcA** ii) **SN2'**

(b) Explain the following:- **4**

i)NGP of aryl rings in nucleophilic substitution reaction

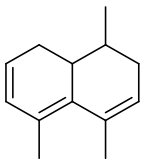
ii)Overtone and combination bands in IR spectra.

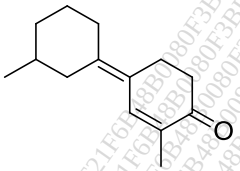
(c) Explain **n ⟶ π*** transition of acetone appears at 279 nm inhexane and 264 nm in water. **4**

(d) Explain Aromatic nucleophilic substitution reaction with the help of benzynemechanisms. **4**

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

(a) Calculate the λmax of the following compounds **4**

i) 

ii) 

[Note: Increments for alkyl substituents on enonechromophore α = 10 nm, β= 12 nm and higher=18 nm]

(b) Explain in the following : **4**
i)Vibrational coupling
ii)Bathochromic effect and hypsochromic effect

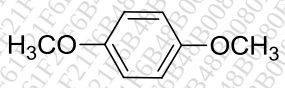
Q.4(A) Attempt any **two** of the following :

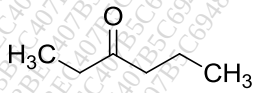
(a) a) An Organic Compound having M.F. $C_5H_{11}ON$ showed following spectral dada: **4**
I.R. = 3500 cm^{-1} , 2970 cm^{-1} , 1690 cm^{-1}.
^{1}H-NMR = δ 0.9 (6H, d,), δ 1.3 (1H, m), δ 2.4 (2H, d) and δ 3.0 (2H, bs, exchange withD_2O). Deduce the structure of the compound and justify your answer.

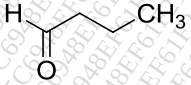
(b) Explain the following in Mass spectroscopy with one example each. **4**
i) Ortho effect ii) Nitrogen rule

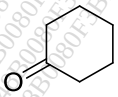
(c) How will you distinguish between 2-pentanone and 3-pentanone by Mass spectroscopy? **4**

(d) Write the number of signals and splitting pattern observed in the NMR spectra of following molecules: **4**

i) 

ii) 

iii) 

iv) 

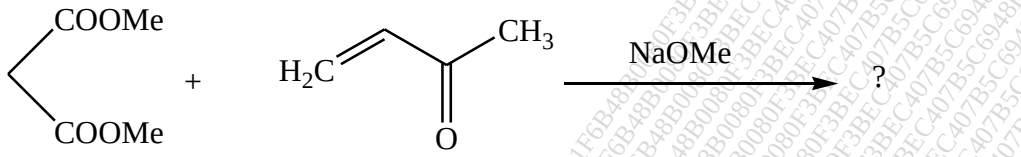
(B) Attempt any **one** of the following:

(a) Write the fragmentation pattern of the following molecules in Mass spectroscopy. **4**
i) Benzyl alcohol ii) 2-butanone

(b) An Organic Compound having M.F. $C_{10}H_{12}O_2$ showed following spectral dada: **4**
I.R. = 3090 cm^{-1} , 2970 cm^{-1} , 1735 cm^{-1}, 1250 cm^{-1}.
^{1}H-NMR = δ 0.9 (3H, t, J = 6.5Hz), δ 4.3 (2H, q, J = 6.5Hz), δ 7.2 (2H, d, 7.5Hz), δ 7.7 (2H, d, J = 7.5Hz) 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**

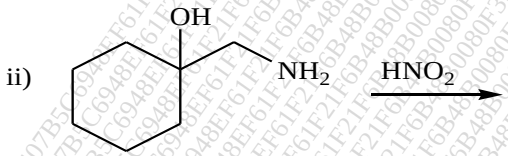


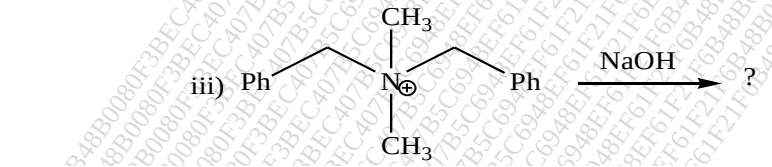
B Complete the following reaction and explain its mechanism. **3**

C Explain Brook rearrangement with its mechanism. **3**

D Complete the following reactions. **3**

i) $C_2H_5CH{=}CHCH_3 \xrightarrow[WCl_6..EtOH]{Et\ AlCl_2}$?





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 λmax 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**
