Q.P. Code : 35407

[Time: 2.5 Hours] **[Marks: 60]**

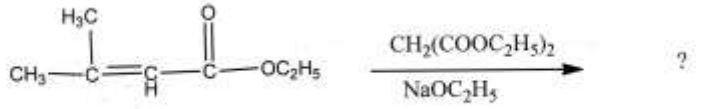
Please check whether you have got the right question paper.

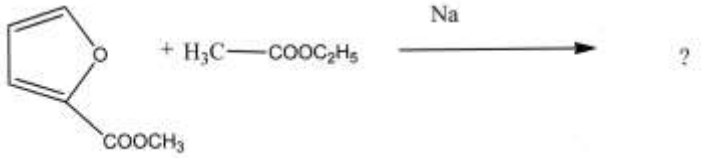
N.B: 1. **All** questions are **compulsory**.
2. **Figures** to the **right** indicate **full** marks

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

a) Discuss Dieckmann cyclization with mechanism. 04

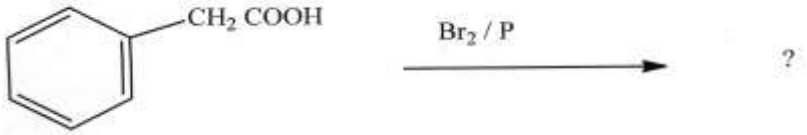
b) Predict the product and name the following reactions: 04

(i) 

(ii) 

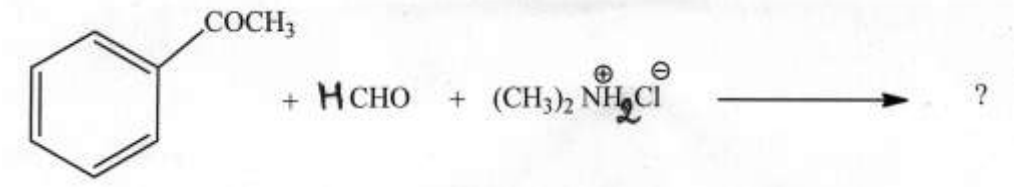
c) Using a suitable example, explain the mechanism of Robinson annulation. 04

d) Complete the following reaction, name it and explain its mechanism: 04



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

a) Predict the product and give the mechanism for the following reactions: 04



b) Explain giving reasons which enolate is formed when 2-heptanone is treated with: 04

i) LDA, THF, - 78^0C

ii) $NaOCH_3$/ CH_3OH, 25^0C

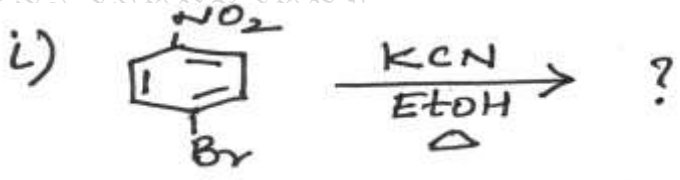
Q.2 A) Answer **any two** of the following:

a) Explain the following rearrangement reactions with one example each. 04

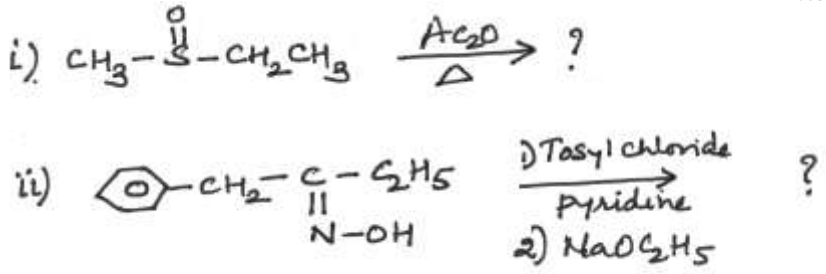
i) Claisen ii) Demjanov

b) What is Brook rearrangement? Explain its mechanism. 04

c) Complete the following reaction and give its mechanism. 04

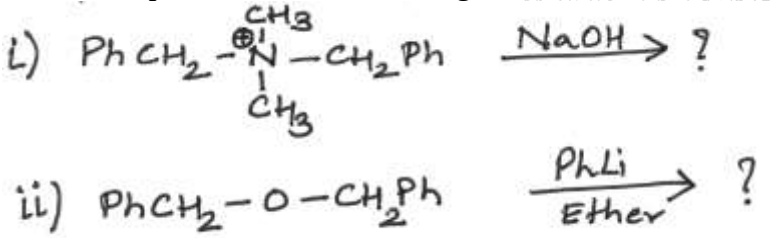


d) Complete the following reactions and give the mechanism for **any one** of them: 04



B) Answer **any one** of the following:

a) Predict the products of the following reactions and name them. 04



b) What is Wolff rearrangement? Give its mechanism. 04

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

a) Discuss the S_N^i mechanism with stereochemistry. 04

b) Give the mechanism of the reaction of chlorobenzene with sodamide in liquid ammonia. 04

c) Calculate the absorption maxima for the following compounds: 04

d) Explain the following: 04

i) Role of H-bonding in IR spectroscopy

ii) Finger print region

B) Answer **any one** of the following:

a) Differentiate between S_N^1 and S_N^2 reactions on the basis of: 04

i) structure of substrate ii) nature of nucleophile

b) How will you distinguish between the following pairs of compounds on the basis of IR spectroscopy: 04

i) CH_3CONH_2 and $CH_3CH_2NH_2$

ii) cis – and trans- cinnamic acid

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

a) Explain the following: 04
   i) McLafferty Rearrangement
   ii) Retro Diels-Alder Reaction

b) Write a note on magnetic anisotropy. 04

c) Give the fragmentation pattern of the following molecules: 04
   i) Pentanal ii) n-Butylbenzene

d) An organic compound A (Molecular formula: $C_9H_{10}O_2$) exhibits the following spectral data: 04
   IR: 1745cm^{-1}(s), 1225cm^{-1}(br, s), 749cm^{-1}(s), 697cm^{-1}(s)
   ^1H NMR = δ 1.96 (3H, s); 5.00 (2H, s); 7.22 (5H, s)
   Deduce the structure of the compound.

B) Answer **any one** of the following:

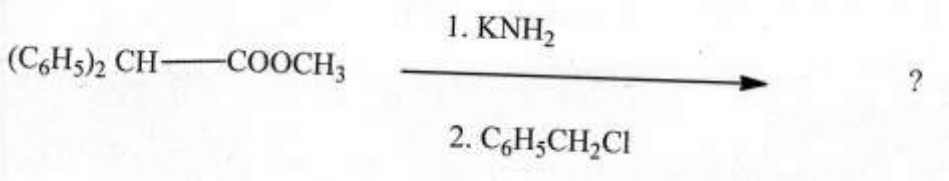
a) Explain the following with respect to NMR spectroscopy: 04
   i) Karplus curve and its significance
   ii) Spin-spin coupling

b) Predict the number of signals and splitting pattern of the protons in the following molecules (PMR spectra): 04
   i) t-butyl alcohol ii) Isopropyl alcohol

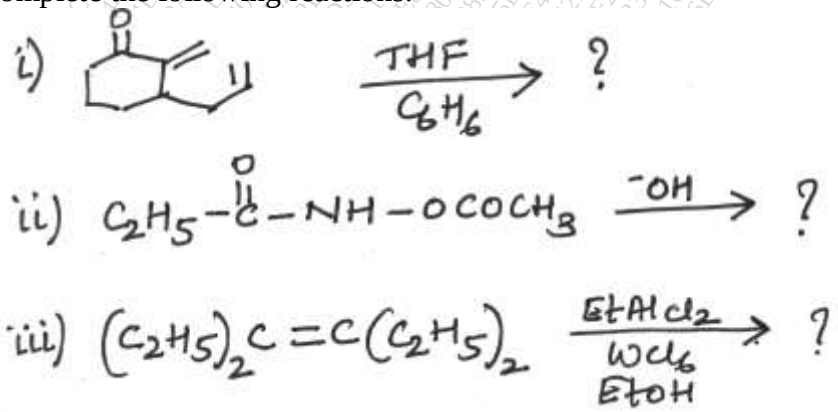
Q.5 Attempt **any four** of the following: 12

A) Write a stepwise mechanism for the reaction between acetone and excess of iodine in NaOH.

B) Predict the product and give the mechanism of the following reaction.



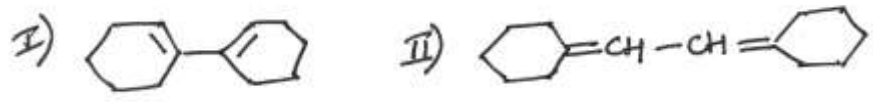
C) Complete the following reactions:



D) Explain the mechanism of Schmidt rearrangement with suitable example.

E) Write **$B_{Al}1$** mechanism for the hydrolysis of t-butyl acetate.

F) Why is the λ_{max} for the diene I observed at a lower wavelength than diene II?



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G) Explain the following terms in mass spectrometry:
   i) Base peak
   ii) Molecular Ion peak
   iii) Isotopic abundance

H) Why is TMS used as a reference standard in NMR spectroscopy?

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