

B.Sc. Semester-IV Examination, 2022-23**CHEMISTRY [Honours]**

Course ID : 41413 Course Code : SH/CHEM/403/C-10

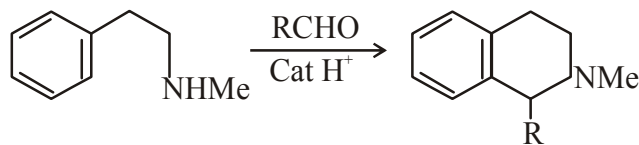
Course Title : Organic Chemistry IV (T-10)

Time : 1 Hour 15 Minutes

Full Marks : 25

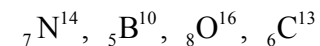
*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*

1. Answer any **five** questions: 1×5=5
- What do you mean by 'finger-print region' in I.R. spectra?
 - Define 'synthetic equivalent' with example.
 - Why is excess of diazomethane used in Arndt-Eistert synthesis?
 - Arrange the all-possible transitions in U.V. spectroscopy in order of increasing energy.
 - Using Mannich reaction as a guide, suggest a mechanism for the following reaction:

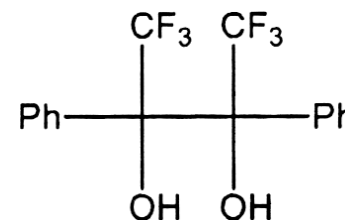


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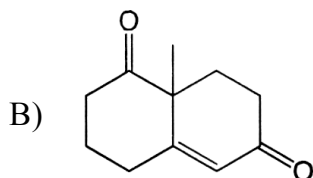
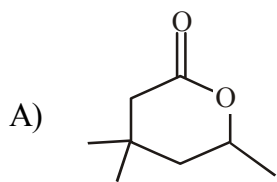
- f) Identify, which of the following nuclei is NMR inactive.



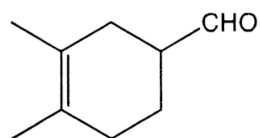
- g) What is chromophore?
 h) Explain why the following compound does not undergo Pinacol-Pinacolone Rearrangement:



2. Answer any **two** questions: 5×2=10
- Among the isomeric compounds of molecular formula $\text{C}_5\text{H}_{12}\text{O}$ choose one having ${}^1\text{H-NMR}$ containing peaks, both singlets at $\delta 1.1(9\text{H})$ and $\delta 2.1(3\text{H})$.
 - Name one internal standard for NMR spectroscopy and explain its two advantages for using as internal standard in that spectroscopic studies. 2+1+2
 - Show the retrosynthetic analysis of the following compound and carry out the forward synthesis:



- ii) Give the retrosynthetic pathways and then synthesize the following compound:



3+2

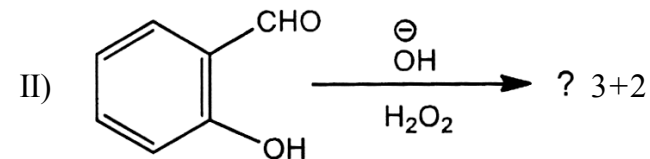
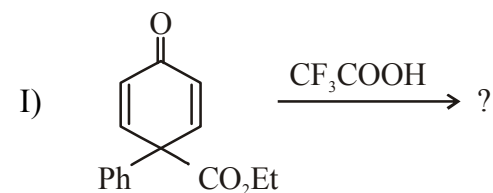
- c) i) How would you differentiate between the following by mentioned spectroscopic method?

- I) Benzaldehyde and acetaldehyde (I.R.)
 II) o-Xylene and p-Xylene (NMR)
 III) 2-methylbutadiene and 2-methyl-2-butene (U.V.)

- ii) Arrange the following in order of increasing stretching frequency:

- I) C—H, S—H, N—H, O—H.
 II) =C—H, —C—H, ≡C—H. 3+2

- d) i) What happens when cyclohexanone is treated initially with hydroxylamine hydrochloride and subsequently with phosphorus pentoxide? Predict the product(s) with mechanism.
 ii) Predict the product in each of the following reactions:

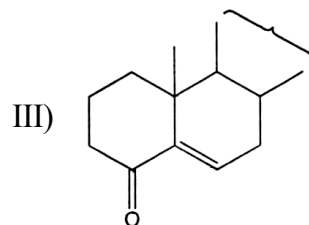
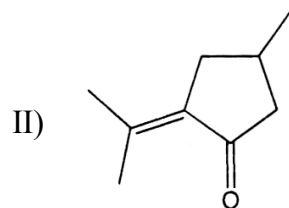
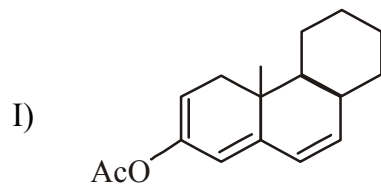


3. Answer any **one** question: 10×1=10

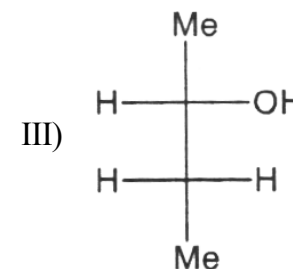
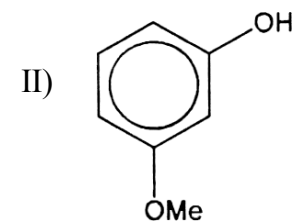
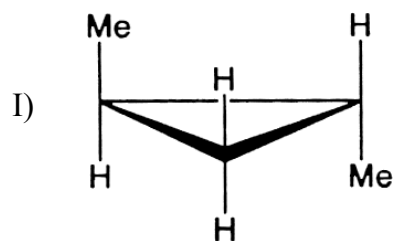
- a) i) Compound 'P' is asymmetric (MF=C₅H₁₀O), and contains two methyl groups and 3^o functional group. IR: broad band in the 3200-3550 cm⁻¹ region, no absorption at 1620-1680 cm⁻¹.

Propose a structure for 'P'. Is your suggested structure capable of showing stereoisomerism?

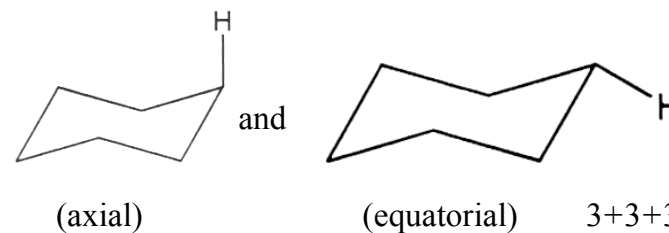
ii) The λ_{\max} values of the following compounds are 242 nm, 254 nm and 259 nm. Which is for which?



iii) How many $^1\text{H-NMR}$ signals will be observed for each of the following compounds?



iv) Distinguish the following pair by $^1\text{H-NMR}$ analysis:



b) i) What do you mean unpolung reaction? Account for the use of 1,3-propanedithiol over ethylene glycol in these reactions. Show how would you convert benzaldehyde to acetophenone.

- ii) Show how you could prepare 1-phenyl-1,4-pentanedione from ethyl acetoacetate and any necessary reagents.
- iii) Give the retrosynthetic pathways and then synthesize the following compound.

(1+1+2)+3+3

