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III Semester M.Sc. Degree Examination, April/May - 2022

CHEMISTRY

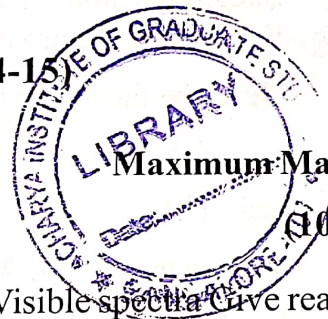
Organic Spectroscopy

Paper - 303 OC

(CBCS Scheme Repeaters 2014-15)

Time : 3 Hours

Answer any TEN of the following :



Maximum Marks : 70

(10×2=20)

1. a) Name the most common solvent used to record UV-Visible spectra. Give reasons for its use.
 - b) Define chromophore. Give its relation to an auxochrome
 - c) Write the mathematical equation of Beer-lambert law and elaborate the terms.
 - d) Sketch the Karplus curve and highlight its importance.
 - e) Give reasons why TMS is used as an internal standard in NMR spectroscopy.
 - f) Mention the two relaxation methods encountered in NMR spectroscopy.
 - g) Reason why benzene gives only one signal at $\delta : 7.33$ ppm in its ^1H NMR Spectrum
 - h) Draw the low- and high-resolution ^1H NMR of ethanol.
 - i) How is the formation of carbocation recognized by ^{13}C NMR spectroscopy?
 - j) Illustrate the Nitrogen rule with suitable example.
 - k) Highlight the importance of base peak in EI-MS.
 - l) Indicate any one method to identify the molecular - ion peak in a mass spectrum.
2. a) Outline Scott's rules to predict the λ_{max} of aromatic carbonyl compounds.
 - b) Discuss sample handling techniques of IR - Spectroscopy. (5+5=10)
3. a) Highlight the complementarity of IR- and Raman-spectroscopies.
 - b) Illustrate the advantages of FT-NMR technique over CW-NMR.

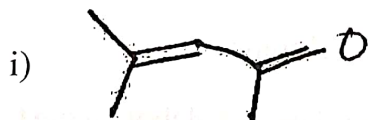
[P.T.O.]





- c) A compound has molecular formula C_7H_8 . It gave two signals in its 1H NMR at δ : 7.3-7.2 (m, 5H) and 2.34 ppm (S, 3H) Deduce the structure of the molecule. (4+3+3=10)

4. a) With the help of a neat diagram, discuss the instrumentation and working of a double beam EI-MS instrument.
 b) Sketch the table of chemical shifts for various carbon environments encountered in ^{13}C - NMR spectroscopy. (6+4=10)
5. a) Describe the following methods of ionization and indicate their usefulness:
 (i) FAB-
 and (ii) MALDI -Tof
 b) Write a note on HRMS (6+4=10)
6. a) Predict the λ_{max} for the following compounds:



- b) What are fermi-resonance bands? How are they formed? Give their usefulness.
 c) Discuss any two methods for the simplification of complex 1H NMR spectra (4+3+3=10)
7. a) State and explain the first-order splitting rules of 1H NMR spectroscopy.
 b) A compound gave the following data :
 Mol. formula $C_9H_{10}O$
UV : 260 nm
IR : 3018, 2978, 1715 and 960 cm^{-1}
 1H -NMR : δ : 7.27 (m, 5H), 3.61 (S, 2H)
 and 2.10 (S, 3H) ppm
 ^{13}C NMR : δ : 206.1, 134.5, 130.1, 128.2,
 126.7, 50.1 and 30.2 ppm
 MS : 134 (M^+) and 91 (base peak)
 Deduce the structure of the molecule and assign the values. (4+6=10)



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8. Write short notes on:

- a) DEPT
- b) Mclafferty rearrangement
- c) NMR of compounds possessing ^{19}F and ^{31}P Nuclei.

(4+3+3=10)

