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Reg. No. | | | | | | | | |

III Semester M.Sc. Degree Examination, April/May - 2022
CHEMISTRY
Organic Spectroscopy
Paper - 303 OC
(CBCS Scheme Repeaters 2014-15)

Time : 3 Hours **Maximum Marks : 70**

Answer any TEN of the following : **(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 δ : 7.33 pm in its 'H NMR Spectrum

h) Draw the low- and high-resolution 'H 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 |R - Spectroscopy. **(5+5=10)**

3. a) Highlight the complementadity of |R- and Raman-spectroscopies.

b) Illustrate the advantages of FT-NMR technique over CW-NMR.

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c) A compound has molecular formula C_7H_8. It gave two signals in its 'HNMR 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 been EI-MS instrument.

b) Sketch the table of chemical shifts for various carbon environments encountered in ^{13}C - NMR spectroscopy. **(6+4=10)**

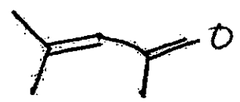
5. a) Describe the following methods of ionization and indicate their usefulness:

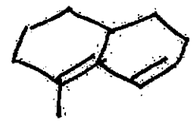
(i) FAB-

and (ii) MALDI - Tof

b) Write a note on HRMS **(6+4=10)**

6. a) Predict the λ_{max} for the following compounds:

i) 

ii) 

b) What are fermi-resonance bands? How are they formed? Give their usefulness.

c) Discuss any two methods for the simplification of complex 'H 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}CNMR : 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)**

8. Write short notes on:

a) DEPT

b) Mclafferty rearrangement

c) NMR of compounds possessing 19F and ^{31}P Nuclei. **(4+3+3=10)**