SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
B.Sc.Chemistry - END SEMESTER EXAMINATIONS - NOV'2024
SEMESTER - V
22UCHCT5012 - Spectroscopy

Total Duration : 2 Hrs.30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. What are Born-Oppenheimer approximations? Give its significance.
2. Illustrate vibrational frequency.
3. Analyze the factors that affect the chemical shift values in proton NMR spectroscopy.
4. Describe the principle of mass spectrometry and explain how it allows for the determination of molecular weight and structure of a compound.
5. Draw and explain various components of spectrophotometer.
6. Discuss the applications of IR and Raman spectroscopy in identifying carboxylic and hydroxyl groups.
7. Describe how you would analyze the proton NMR spectra of the following organic compounds: ethanol and chlorobenzene
8. Discuss the nitrogen rule in mass spectrometry and its application in determining the molecular formula of any one of the organic compounds.

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. (i) Classify spectra. (4 mark)
   (ii) Describe the properties of electromagnetic radiation. (6 mark)
10. Compute the calculation of γ_{max} of conjugated dienes and α, β -unsaturated ketones by the use of Woodward - Fieser Rules.
11. Differentiate the following
    (i) Harmonic and anharmonic oscillator (4 mark)
    (ii) IR and Raman spectroscopy (6 mark)

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12. (i) Discuss the role and significance of tetramethylsilane (TMS) as a reference compound in NMR spectroscopy. (4 mark)

    (ii) Explain how spin-spin coupling patterns in NMR spectra reveal information about the number and arrangement of neighbouring nuclei.
    Discuss the factors affecting coupling constant. (6 mark)

13. (i) Assess m/z for the fragments of the following compounds from their molecular ions (6 marks)

    (a) Chlorobenzene
    (b) Acetophenone

    (ii) Infer the fragments of 1-hexene based on McLafferty rearrangement.(4 marks)

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