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.
M.Sc.(Chemistry) END SEMESTER EXAMINATIONS NOVEMBER - 2023
SEMESTER - III
22PCHCT3008 - Molecular Spectroscopy and its Applications

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

Section B

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

1. Compare n - π * and π - π * transitions with suitable examples.
2. Calculate the approximate frequency of C-H stretching vibration from the following data:
   k=5x10 5 g s-2, mass of C atom = 20 x 10 -24 g s-2,
   mass of H atom = 1.6 x 10 -24 g
3. Use (n+1) rule to predict the splitting patterns in the following compounds.
   a. CH_3CH_3
   b. CH_3-CHCl-CH_3
   c. $CHBr_2$-CH_2Br
4. Analyse why aromatic protons are more deshielded than ethylenic protons, although both the types of protons are attached to sp2 hybridised carbon.
5. Illustrate Mc-Lafferty rearrangement by giving suitable examples.
6. An organic compound reduces Tollen's reagent and its mass spectrum shows signals at 172(M+), 143, 141, 129, 87, 74, 59, 56, and 43. Justify the signals by writing the fragmentation mode.
7. Appraise the theory of ESR with example.
8. Explain the principle of NQR and the interaction between quadrupole nucleus and electric field gradient.

Section C

I - Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. Assess the influence of polarity of solvent on different types of transitions.
10. Explain in detail, homonuclear and heteronuclear decoupling technique.
11. Explain the fragmentation pattern of a) Benzoic acid b) Phenol.

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12. Explain zero field splitting and krammers degeneracy.

II - Compulsory question $(1 \times 10 = 10$ Marks)

13. An organic compound with molecular mass 72 absorbs at 274 nm ϵmax 17. In infrared a strong absorption band is formed at 1715 cm-1 and medium absorption bands are formed at 2941-2857cm-1(m) and at 1460 cm-1 (m). The signals in the nuclear magnetic resonance spectrum are
(i) 7.52 τ quartet (J =7.3 cps, 12 squares) 7.88 τ singlet (17.6 squares) and 8.93 τ (Triplet) (J = 7.3 cps, 18.2 squares).Predict the structure of the compound.

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