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Total No. of Pages : 02

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M.Sc.(Chemistry) (Campus) (2015 to 2017) (Sem.-1) ORGANIC SPECTROSCOPY Subject Code : CHL-404 M.Code : 51143

Time: 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains SIX questions carrying FIVE marks each and students have to attempt ALL questions.
- 3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

- 1. Which is the main component of mass spectroscopy deal with resolving the ions into their characteristics mass components according to their mass-to-charge ratio?
- 2. Why the magnitude of coupling constant is higher in the case of benzene rather than cyclohexanes?
- 3. In which state of matter mass spectroscopy is being performed?
- 4. What transition is not observed by general UV-Vis spectrophtotmeter?
- 5. When you use CDCl₃ as a solvent in ¹³C NMR, why are getting extra triplet at ~ 76 ppm?
- 6. How will you calculate the coupling constant in a given ¹H-NMR spectra?
- 7. What is the essential condition for a molecule to be IR active?
- 8. Write the possible electronic transitions in the benzaldehyde.
- 9. Why Aniline shows blue shift in acidic medium?
- 10. Which bond will vibrates faster between following combinations?
 - a) C-H or C-D
 - b) C-O or C-Cl



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SECTION-B

11. A compound $C_{10}H_{13}Cl$ gave the following NMR data :

 δ 1.57, singlet, 6H; δ 3.07, singlet, 2H; δ 7.27, singlet, 5H. Deduce the structure of compound.

- 12. Write a short note on McLefferty rearrangement.
- 13. How would you distinguish ethylamine, diethylamine and triethylamine using Electronionization mass spectrometry (EI-MS) technique?
- 14. A compound $C_{10}H_{14}$ gave the following NMR data: δ 0.88 (d, 6H); 1.86 (m, 1H); 2.45 (d, 2H); 7.12 (s, 5H). Deduce the structure of compound.
- 15. Write a short note on the importance of DEPTH technique in 13C NMR spectroscopy.
- 16. Why the intensity of N-H and O-H absorptions is stronger than C-H absorption?

SECTION-C

- 17. How do the following factors affect vibrational frequency in infrared spectroscopy?
 - a) Hydrogen bonding
 - b) Inductive effect and conjugation
- 18. Explain chemical ionization method uses in mass spectrometry. Why does chemical ionization method give $(M+1)^+$ peak? Describe using chemical equations.
- 19. Spectral data are given below, determine the structure :

Molecular formula : C₄H₆O

IR frequencies in cm⁻¹: 2855, 2740, 1700, 1650

¹H-NMR: 9.7 (1H, d), 6.7 (1H, dq), 6.9 (1H, dd, J=7 & 17 Hz), 2.5 (3H, d).

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

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