Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 19

PIT M.Sc.(Chemistry) (Sem.-1)

ORGANIC SPECTROSCOPY

Subject Code : CHL-404

Paper ID : [51143]

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

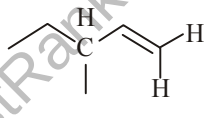
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying FIVE marks each and students have to attempt ALL questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

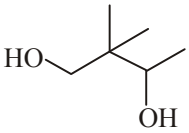
1. Why is the magnitude of coupling constant is higher in the case of benzene rather than cyclohexanes?

2. What informations, we can get from DEPT-90 and DEPT-135 NMR experiments.

3. What will be the splitting pattern for allylic proton in the following molecule?



4. Write the number of peaks will appear for the following molecule in ^{1}H-NMR.



5. Write the possible electronic transitions in the benzaldehyde.

6. Why Aniline shows blue shift in acidic medium?

7. Which bond will vibrates faster between following combinations?

   (a) C-H or C-D

   (b) C-O or C-Cl

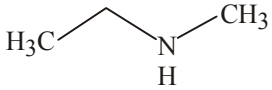
8. Divide the IR frequency range (4000 cm^{-1} to 600 cm^{-1}) in four regions according to bond vibrational frequencies.

9. Why do you need to ionize the molecule in mass spectrometry?

10. Why do you get $(M+H)^+$ peak in case of CI-MS technique?

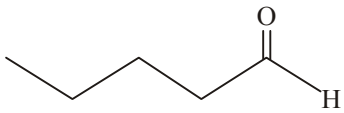
SECTION-B

11. What will be the characterization peak of the following amine in EI-MS technique?



M.W.=59

12. How will you get the fragments having m/z= 85, 44 and 30 in the following molecule? Which will be the base peak among them?



M.W. = 86

13. Explain the Beer lambart's law.

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. When you use $CDC1_3$ as a solvent in ^{13}C NMR, why are getting extra triplet at ~76 ppm?

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. What are the masses of the ions produced in the mass spectrum of 4-*n*-butyl toluene by (a) benzylic fission

    (b) the Mc-lafferty rearrangement?

19. (a) In the NMR spectrum, the scale on x-axis appears in the unit "part per million" not in the magnetic field units or frequency unit. Why?

    (b) Why do chemically distinct nuclei absorb energy at different frequencies?