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Class – B.Sc.III BT Semester (VI)

Subject – Spectroscopy

Paper – Theory

Time Allowed : 3 Hours

Maximum Marks : 40

SECTION-A

Attempt all questions. Each question carries one mark.

1. What is molecular ion peak?
2. Name a compound in which parent ion peak is not seen.
3. Which is base peak of Toluene?
4. What is metastable ion?
5. Name two solvents used for NMR spectroscopy.
6. Define coupling constant J. What are its units?
7. What is Larmor frequency?
8. What are the units of chemical shift? Why these units are used?

$8 \times 1 = 8$

SECTION-B

Attempt any five questions. Each question carries 4 marks.

9. Write fragmentation patterns of Ethylamine and Ethanol.
10. Write a note on MC-Lafferty rearrangement.
11. (a) Why metastable peaks are broad?
(b) What is β -cleavage? Give example.
12. What are characteristics features of mass spectra of alcohols?
13. What is chemical shift? Explain.
14. How PMR spectra of pure ethanol and 95% Ethanol differs?

15. (a) Why TMS is used as a standard reference in NMR?
(b) What are Equivalent and non –equivalent protons? Give example.

16. Why protons of acetylene are shielded while are deshielded for ethene?

SECTION-C

Attempt any two questions. Each question carries 6 marks.

17. A volatile organic compound with molecular mass 74 gave following spectral data.

- (a) 6.1τ singlet (13.0 square)
(b) 6.45τ septet (4.1 square)
(c) 8.9τ doublet (25.4 square)

Predict the structure of the compound.

18. An organic compound has molecular mass 120 and it burns with a sooty flame. It gave positive sodium bicarbonate test after oxidation. In NMR analysis following peaks are obtained.

- (a) 0.55τ (Triplet, 5.3 square)
(b) 2.75τ (Singlet, 27.0 square)
(c) 7.20τ (Doublet, 11.0 square)

Predict the structure of compound.

19. Find the structure of an organic compound which gave peaks in mass spectra at 102, 87, 74 (MR ion), 71, 59, 43, 41 and 29.

Justify all modes of fragmentation also.

20. The values of m/e for a hydrocarbon are obtained at 100, 43 (100%), 57, 85, 71, 41, 29. Predict the structure of compound and justify the peaks.

$$6 \times 2 = 12$$
