LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

FIFTH SEMESTER – **NOVEMBER 2018**

CH 5508/ CH 5513 – FUNDAMENTALS OF SPECTRASCOPY

Date: 02-11-2018 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

PART – A

Answer ALL the questions. **(10x2=20)**

1. What are the regions of electromagnetic spectrum?
2. Define resolution.
3. State Lambert-Beer's Law.
4. Benzene is colourless but its isomer Fulvene is yellow. Give reasons.
5. Give the importance of finger print region.
6. Describe the types of stretching vibrations with neat sketch.
7. Define coupling constant.
8. What is deuterium labelling?
9. Justify nitrogen rule by an example.
10. What is the significance of molecular ion peak?

PART – B

Answer any EIGHT questions. **(8x5=40)**

11. Explain the factors that affect the line width and intensity of spectral lines.
12. Discuss the differences between absorption and emission spectra.
13. Explain the principle and instrumentation of flame photometry.
14. Explain the different types of electronic transitions.
15. Explain the types of vibration in the IR spectrum of CO_2.
16. Differentiate between IR and Raman spectroscopy.
17. Explain cell sampling technique in IR spectroscopy.
18. What is chemical shift? Mention the factors that affect chemical shift.

19. An organic compound with molecular formula C_5H_{12} show two signals in its NMR spectrum with a triplet at 0.9 δ, 6H and multiplet at 1.28 δ due to six protons. Give the structural formula.

20. Mention the applications of NMR spectroscopy.

21. Discuss the factors which influence fragmentation in mass spectrometry.

22. Predict the structure of the compound whose peaks have m/e values 86, 71, 58, 43 (100%).

PART – C

Answer any FOUR questions. **(4x10=40)**

23. (a) Describe the instrumentation of photo calorimeter with block diagram. **(5)**

(b) Write the applications of atomic absorption spectroscopy. **(5)**

24. (a) Explain Frank-Condon Principle and discuss its consequences. **(5)**

(b) Discuss the factors governing absorption maximum and intensity. **(5)**

25. (a) Mention the applications of mutual exclusion principle. **(5)**

(b) Write notes on Rayleigh and Raman scattering. **(5)**

26. (a) How will you distinguish intramolecular hydrogen bonding from intermolecular hydrogen bonding by IR spectroscopy. **(5)**

(b) Differentiate $CH_3CH_2COCH_3$ and $C_6H_5COCH_3$ using IR spectra. **(5)**

27. (a) Define and give the significance of coupling constant? **(5)**

(b) Discuss the basic instrumentation in NMR. **(5)**

28. (a) Discuss McLafferty rearrangement with two examples. **(5)**

(b) Explain the mass spectrum of C_6H_5CHO and CH_3CH_2OH. **(5)**

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