

**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

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

**FIFTH SEMESTER – NOVEMBER 2015**

**CH 5508 - FUNDAMENTALS OF SPECTRASCOPY**

Date: 25/09/2015  
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

**PART - A**

Answer ALL the questions:

(10x2=20)

1. Distinguish between absorption spectra and emission spectra.
2. Define 'resolution'.
3. Explain progression.
4. Write the types of electronic transitions and arrange them in increasing order of energy.
5. Sketch the types of bending vibrations.
6. How will you distinguish intramolecular hydrogen bonding from intermolecular hydrogen bonding by IR spectroscopy?
7. List out the factors that affect chemical shift values.
8. How can you distinguish  $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$  from  $(\text{CH}_3)_3\text{COH}$  by  $^1\text{H}$  NMR spectroscopy?
9. What is the significance of base peak?
10. State 'nitrogen rule'

**PART - B**

Answer any EIGHT questions:

(8x5=40)

11. Calculate the energy (in joules) of an electromagnetic radiation of wave length  $2.5 \times 10^3$  nm. Also find the region of electromagnetic region to which this belongs.
12. Discuss the relative population of various transition energy states at different temperatures.
13. Explain McLafferty rearrangement with an example.
14. List out the differences between IR and Raman spectroscopy
15. What is coupling constant? How is it useful?
16. Write the significance of (i) Chromophore (ii) Auxochrome.
17. Describe the various IR bands for ethyl benzoate.
18. Give the merits of tetramethyl silane as a reference in NMR.
19. Describe the instrumentation of Raman spectrometer.
20. State Lambert-Beer's law. Give its mathematical equation. How can it be verified?
21. Explain mutual exclusion principle maxima.
22. How is intra molecular H-bonding differentiated from intermolecular H-bonding using IR?  
Explain.

**PART - C**

Answer any FOUR questions

(4x10=40)

23. Discuss the principle and instrumentation of atomic absorption spectroscopy.
24. Explain the various sample handling methods followed for solid, liquid and gaseous compounds in IR spectroscopy.
25. List out the differences between (i) photocolourimeter and spectrophotometer.
- (ii) Stoke's and antistoke's lines. (5 + 5)
26. a) Give reasons for (i) Peaks for aromatic protons appear at low field in NMR.  
(ii) NMR spectrum is taken at low temperatures. (4)
- b) Discuss the basic instrumentation in NMR spectroscopy. (6)
27. a) Discuss the principle and applications of flame photometry.  
b) How many lines are observed for sodium in flame? Why? (5+5)
28. a) Explain the principle and instrumentation in mass spectrometry.  
b) How will you determine the structure of a compound whose m/e value are 86 (molecular ion), 57 (base peak), 29? (7 + 3)

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