



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – CHEMISTRY

FIFTH SEMESTER – APRIL 2015

CH 5508 – FUNDAMENTALS OF SPECTROSCOPY

Date : 27/04/2015

Dept. No.

Max. : 100 Marks

Time : 09:00-12:00

PART – A

Answer **ALL** questions:

(10x2=20 Marks)

1. Mention the importance of signal to noise ratio.
2. State mutual exclusion Principle.
3. How is absorbance related to transmittance?
4. Distinguish Bathochromic shift from Hypsochromic shift.
5. Name any two sources used in IR Spectroscopy.
6. What is meant by Finger Print region?
7. Mention the significance of TMS as a reference in NMR Spectroscopy.
8. Distinguish neopentane from n-pentane from PMR spectroscopy.
9. What is called Base peak in Mass spectroscopy?
10. In the fragmentation of alkanes, what does m/z of 43 and 57 corresponds?

PART – B

Answer any **EIGHT** questions:

(8x5=40 Marks)

11. Convert the following to energy a) 60 MHz b) 2000 Angstrom **(2+3)**
12. Match the following

Gamma rays	-	Molecular Vibration
Ultraviolet	-	Inner electronic transition
X-Rays	-	Outer electronic transition
Infrared	-	Atomic Nuclear transition
Microwave	-	molecular Rotation
13. Mention the limitations of Beer-Lamberts Law.
14. What are the electronic transitions possible in organic molecules? Arrange them in the order of increasing energy.
15. Calculate the number of vibrational modes in a) CO₂ b) Water
16. Describe the relative population of rotational, vibrational and electronic energy levels.
17. Distinguish Raman spectroscopy from IR spectroscopy.
18. Differentiate Propanol from isopropanol by H¹ NMR techniques.
19. Classify the following nuclei as NMR active or inactive ⁶C¹³, ¹H¹, ⁹F¹⁹, ⁶C¹², ⁷N¹⁴ and ¹⁰Ne²⁰
20. Explain shielding and deshielding of protons with reference to Benzene.
21. What is meant by Nitrogen rule?
22. Explain McLafferty rearrangement with an example.

PART - C

Answer any **FOUR** questions

(4x10=40 Marks)

23. a) Mention the laws of Photochemistry. **(5)**
b) Explain the following i) Auxochrome ii) Chromophore **(5)**
24. Sketch and explain the working of a double beam spectrophotometer
25. a) Write a note on stretching and bending vibrations **(6)**
b) Distinguish Ortho and Para nitro phenol using IR Spectroscopy **(4)**
26. Differentiate the following
i) Raman Scattering from Rayleigh scattering
ii) Stokes from Antistokes lines. **(5+5)**
27. A compound of molecular formula C_6H_{14} has five isomers. These five isomers exhibit large difference in their splitting of signals by their nearest proton. Identify the five isomers and predict the NMR pattern for any three isomers.
28. Sketch and explain the mass spectrum of Methylcyclopentane.
