

- Q-2 Answer the following short questions. Each question carries equal mark. (Any Seven) (14)
1. What is Lambert's law for absorption?
 2. Give possible band and vibration frequency of amide and amines for IR spectra.
 3. What is the basic condition for NMR spectroscopy?
 4. Define spin-spin relaxation process.
 5. Give the classification of chromatography.
 6. What is peak asymmetry?
 7. Which types of samples will give TGA?
 8. What is Moseley's law?
 9. What is the application of EDX analysis?

- Q-3 (a) Discuss the sampling techniques for solid and liquid sample for IR spectroscopy. (06)
- Q-3 (b) Explain with figure various modes of vibration in IR spectroscopy. (06)

OR

- Q-3 (b) i) Interpret the spectral data and deduce the structure of following compound: (03)

Molecular formula: $C_9H_{11}NO_2$

IR Data (in cm^{-1}): 3020, 2965, 2872, 1745, 1620, 1410, 1375, 1050,

NMR Data:

δ	Multiplicity	No. of Protons
1.22	Triplet	3H
3.25	Singlet	2H
4.10	Quartet	2H
6.92-7.75	Multiplet	4H

- ii) Explain with example van der Waals de-shielding effect on chemical shift. (03)

- Q-4 (a) Explain the cleavage of n-hexanol and show its possible peaks. (06)

- Q-4 (b) Write a note on i) Quadrapole mass filter ii) Time of flight mass spectrometer. (06)

OR

- Q-4 (b) i) Briefly explain the method of determining resolution in mass spectrogram. (03)

- ii) Explain with example Mc-Lafferty rearrangement. (03)

- Q-5 (a) Draw a schematic diagram of HPLC instrument and explain different parts of it. (06)

- Q-5 (b) Write a note on i) Analytical Column and Guard Column ii) plate height & plate no's. (06)

OR

- Q-5 (b) Write a note on effect of hydrogen bonding on chemical shift of proton. (06)

- Q-6 (a) Describe various factors affecting DSC and DTA. (06)

- Q-6 (b) Explain in detail effect of high energy radiation on electron in various energy shells. (06)

OR

- Q-6 (b) Write a note on strengths and limitations of scanning electron microscope (SEM). (06)