

M.Sc.(Chem.) Semester - 4 (CBCS) Examination**April/May-2023 (OLD COURSE)****ADVANCE SPECTROSCOPIC TECHNIQUES(CORE)****Time: 2:30 Hours****Marks: 70****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate marks.

Q.1 Answer the following questions. (Any Seven) (14)

1. Why ^{13}C NMR is less sensitive?
2. What is the basic difference between ^{13}C and ^1H NMR Spectroscopy.
3. Why TMS is used as standard in NMR.
4. What is spin-spin splitting explain with one example.
5. What is EMR? briefly explain about EMR spectrum.
6. What is molecular ion peak?
7. Give the principle of Mass Spectroscopy.
8. Write region and units of UV-Visible and IR Spectroscopy.
9. Briefly explain the use of AR grade potassium bromide and sodium chloride in IR.
10. Give the principle of Raman spectroscopy.

Q.2 Answer the following questions. (Any Two) (14)

1. State Beer–Lambert law and distinguish between absorbance and emission spectroscopy.
2. Give the principle, applications and limitations of ESR spectroscopy
3. Derive an equation which forms basis of separation of ions according to their masses in mass spectrometer.

Q.3 Answer the following questions. (14)

1. Name the major parts of UV-Viz spectrophotometer and describe it's function.
2. Discuss the basic instrumentation of double beam IR spectroscopy.

OR**Q.3 Answer the following questions.**

1. Discuss types of shifts in UV-Viz spectroscopy with figure. (05)
2. Discuss any two sample preparation techniques for IR spectroscopy. (05)
3. Briefly explain following: (I) Chromophore (II) Auxochrome (04)

Q.4 A. Answer the following questions. (Any Two) (10)

1. Explain various region of chemical shifts for ^{13}C NMR Spectrum.
2. Explain Shielding and Deshielding effect in PMR spectroscopy.
3. Discuss ESR spectrum of $\text{K}_3\text{Fe}(\text{CN})_6$.

B. Answer the following questions. (Any One)

1. Explain Raman scattering in brief. (04)
2. Distinguish following pair of compounds with the help of Mass: Octane & Isooctane.

Q.5 Answer the following questions. (Any Two) (14)

1. How will you distinguish between o, m and p Xylene using PMR spectroscopy?
2. Discuss with suitable example: β – cleavage of double bond and aryl double bond.
3. Name the various ionization techniques for mass, explain FAB in detail.
4. Discuss possible electronic transitions in UV-Viz spectroscopy with figure.
