M.Sc. DEGREE EXAMINATION,NOVEMBER 2019
I Year II Semester
Spectroscopy

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. What are linear molecules? Give one example.
2. Describe symmetric top molecules with example.
3. What is meant by normal modes of vibration?
4. Mention few IR sources and their significance.
5. Write the characteristic properties of Raman lines.
6. Define degree of polarization. Discuss its importance in Raman Effect.
7. Define Gyromagnetic ratio.
8. Explain spin lattice relaxation time and spin- spin relaxation time.
9. Define chemical shift.
10. Mention some of the applications of NQR technique.
11. Define anharmonicity.
12. Mention some of the applications of ESR.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Explain rotational fine structure of electronic vibration spectra with neat diagram.
14. Discuss solid –state effects in IR vibrational spectroscopy.
15. With neat diagram, explain the principle and working of FT-RAMAN spectrometer.
16. Describe ESR spectrometer with basic requirements and experimental set-up.
17. Explain the construction and working of Mossbauer spectrometer.
18. Explain recoilless emission and absorption of gamma rays.
19. Explain the concept of nuclear quadruple energy levels for axial and non-axial symmetry.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Explain the splitting of the rotational energy levels of molecules by Stark effect. Discuss first and second order Stark effect.
21. Discuss the principle of FTIR spectroscopy. Describe the interferometer arrangement and working of Fourier transform spectrometer. Mention some of its applications (10).
22. Discuss in detail the application of IR and Raman spectroscopy in molecular structure conformation of CO_2 molecules.
23. Describe NMR spectrometer with neat block diagram and explain its working.
24. Explain the basic concept of Mossbaur effect. Discuss chemical isomer shift and its use in molecular structure analysis.

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