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

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

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

Answer any **TEN** questions

1. Give two examples for symmetric top molecule.
2. What are axes of rotation of a linear molecule?
3. How is the I-R region of electromagnetic spectrum divided?
4. Define Anharmonicity.
5. Why anti stokes line have less intensity than stokes lines?
6. Irradiation of carbon tetrachloride by 4358 angstrom gives Raman line at 4400 angstrom.Calculate Raman shift.
7. State the rules involved in determining the value of nuclear spin.
8. Define chemical shift.
9. State the cause of hyperfine structure in ESR.
10. State the principle of obtaining Mossbauer spectrum.
11. Mention two applications of Mossbauer spectroscopy.
12. What is the advantage of FTIR?

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

Answer any **FIVE** questions

13. Outline the effect of isotopic substitution on rotational spectra.
14. Explain normal modes of vibration of $CO_2$ and explain the dipole moment change in $CO_2$ molecule
15. Explain rotational Raman spectra for linear molecules
16. Explain NMR spectrometer.
17. Explain hyperfine structure of ESR
18. Explain the structural determination of $XY_2$ and $XY_3$ molecules using IR and Raman spectroscopy
19. Give the theory of chemical shift in NMR.

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

Answer any **THREE** questions

20. Discuss the rotational spectra of diatomic and poly atomic molecule of microwave spectroscopy
21. Explain the instrumentation techniques of FTIR spectrometer.
22. Derive Bloch equations.
23. Explain vibrational Raman spectra.
24. Explain in detail NQR instrumentation technique.

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