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. Which of the following molecules will show a microwave rotational spectrum? H_2, HCl, CH_4
2. What is Stark effect?
3. Homonuclear diatomic molecules do not show vibrational spectra. Why?
4. Mention any two advantages of FT-IR spectroscopy.
5. Why anti Stokes lines are less intense than Stokes lines?
6. What is mutual exclusion principle?
7. Write the resonance condition for NMR.
8. Define Larmour frequency.
9. What is NQ coupling constant? Give its unit.
10. Why isomer shift arises in a Mossbauer spectrum?
11. State Why C^{12} does not show any NMR spectrum?
12. Irradiation of CCl_4 by 4358 A^0 radiation gives Raman line at 4400 A^0. Calculate the Raman shift.

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

Answer any **FIVE** questions

13. Write a note on linear polyatomic molecules.
14. Explain the instrumentation of IR spectrophotometer.
15. Describe polarization of Raman scattered light.
16. List the basic requirements of a typical NMR spectrometer.
17. Explain the principle of NQR.
18. Write a note on the study of quadruple hyperfine interaction microwave spectra.
19. Write briefly about Normal modes of vibration in crystal.

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

Answer any **THREE** questions

20. Explain in detail about Rotational spectra of Rigid diatomic molecules.
21. Give the theory in detail about vibrational energy of diatomic molecule.
22. Explain the experimental arrangement and working of a Raman spectrometer with a schematic diagram.
23. Discuss about hyperfine structure of ESR absorption.
24. Explain the Mossbauer spectroscopy and give its mechanism.

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