

Unit IV

No. of Printed Pages : 04

Roll No.

7. Give the principle of NMR spectroscopy.
Explain the various relaxation processes with example. **15**

8. (a) Write a short note on nuclear overhauser effect (NOE). **5**

- (b) Explain the term "chemical shift" and the phenomenon of shielding and de-shielding by taking suitable example. **10**

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M. Sc. EXAMINATION, May 2019

(Second Semester)

(C Scheme) (Main Only)

CHEMISTRY

CH508C

Spectroscopy–I (Molecular Spectroscopy)

Time : 3 Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) State and explain the nature of electromagnetic radiation. **3**
(b) What do you mean by resolving power and selection rules ? Explain. **6**
(c) Briefly explain the intensities of rotational spectral lines for rigid diatomic molecule. **6**
2. (a) Discuss the rotational spectra of rigid diatomic molecule. **8**
(b) Show the effect of isotopic substitution on the rotational spectrum of a molecule. **5**

Unit II

3. (a) Discuss the quantum theory of Raman Spectroscopy. How are Stoke's and Anti Stoke's lines appear in the Raman spectrum of molecule ? **8**

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- (b) Explain the vibrational energy levels for a diatomic molecule undergoing anharmonic oscillation and the resulting vibrational spectrum. **7**
4. (a) Explain the P, Q and R branches in the spectra of vibrating diatomic molecule. **7**
(b) What do you mean by polarization of light and depolarization of Raman lines. ? **5**
(c) State rule of mutual exclusion. **3**

Unit III

5. State and illustrate with suitable potential energy curves the Franck-Condon principle taking an example of a diatomic molecule. **15**
6. (a) Discuss briefly the rotational fine structure of electronic-vibration transitions. **10**
(b) Write a short note on the Fortrat diagram. **5**

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P.T.O.