7. Explain the following : **4,4,4,4**

(i) Equivalent and non-equivalent protons

(ii) Shielding and deshielding

(iii) Anisotropy

(iv) Effect of hydrogen bonding on chemical shift

Unit IV

8. (a) Describe the evaluation of reaction rates of fast exchange reactions. **8**

(b) Explain the double resonance technique. **8**

9. By giving examples, describe the applications of infra-red spectroscopy in the determination of structure of inorganic compounds. **16**

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M.Sc. EXAMINATION, 2026

(Second Semester)

(2020-21 Onwards)

(Re-appear Only)

CHEMISTRY

General Spectroscopy

Time : 3 *Hours*] [*Maximum Marks :* 80

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

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. **1** is compulsory. All questions carry equal marks.

Compulsory Question

1. (a) What is resolving power ? **2**

(b) What is Frank-Condon principle ? **2**

(c) How vibrations of polyatomic molecules are calculated ? **2**

(d) What is the cause of anharmonicity in vibrational spectroscopy ? **2**

(e) What are spin active nuclei ? Give examples **2**

(f) What is Raman effect ? **2**

(g) What is spin-spin coupling ? **2**

(h) Give two examples of fast exchange reactions. **2**

Unit I

2. (a) What are electromagnetic radiations ? How they interact with matter ? **6**

(b) Illustrate the regions of spectrum with width and intensity of spectral transitions. **10**

3. Describe the rotational spectra of diatomic molecule (non-rigid rotator). **16**

Unit II

4. Describe the following : **5,5,6**

(i) Anharmonicity of vibrations

(ii) Fortrat diagram

(iii) Analysis of infra red technique

5. (a) Explain the vibrational spectra of a diatomic molecule (simple harmonic oscillator). **10**

(b) Discuss the electronic spectra of diatomic molecules. **6**

Unit III

6. (a) Compare the classical and quantum theory of Raman effect. **8**

(b) Describe the pure rotational Raman spectra. **8**