(T) Roll No. .....

ID—2403

B.Sc. (Pass Course) EXAMINATION, 2022

(Fifth Semester)

CHEMISTRY—II

Code : CH-502

Physical Chemistry

Time : 3 Hours *Maximum Marks : 29*

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 any *Five* questions. All questions carry equal marks. Use of Calculator (scientific/simple), Algorithm Table is allowed in the examination centre.

(Compulsory Question)

1. (a) Give one advantage of Raman spectroscopy over IR spectroscopy.

(b) What is Doppler's broadening ?

(c) Define orthogonal function.

(d) Define additive property and give *two* examples.

(e) Define Fermi resonance.

Section A

2 (a) Define an operator. Discuss Hamiltonian operator in quantum mechanics.

(b) Discuss various postulates of quantum mechanics.

3. (a) Explain Kirchhoff's law with proof.

(b) Briefly explain how classical mechanics fails when applied to photoelectric effect.

Section B

4. (a) Define Dipole Moment. Describe its importance in deciding cis- and trans-isomers.

   (b) Explain what do you understand by external and internal compensation in optical activity.

5. (a) Define the terms specific magnetic susceptibility and magnetic permeability. Derive the relationship between the two.

   (b) Drive Clausius-Mossotti equation.

Section C

6. (a) What do you mean by spectroscopy ? Give important points of difference between molecular spectroscopy and atomic spectroscopy.

   (b) What type of molecules show rotational spectra ? Explain it by taking one example of each type.

7. (a) Explain different types of energies possessed by a molecule. What is Born-Oppenheimer approximation ?

   (b) Write a short note on Doppler effect.

Section D

8. (a) What is Raman Spectrum ? Explain different types of lines present in it.

   (b) Explain pure rotation Raman spectra of diatomic molecules.

9. (a) Give a brief discussion of structural information from IR spectra of molecules.

   (b) Write the basic principle of vibrational-rotational spectra. Explain different types of lines present in vibrational-rotational spectra of diatomic molecules.