Enrollment No: _____ Exam Seat No:_____

C. U. SHAH UNIVERSITY

Winter Examination-2022

Subject Name : Qualitative Optical Spectroscopic Method - I

Subject Code : 5SC03QSC1 **Branch: M.Sc. (Chemistry)**

Semester: 3 **Date: 22/11/2022** **Time: 11:00 To 02:00** **Marks: 70**

Instructions:

(1) Use of Programmable calculator and any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

SECTION – I

Q-1 **Attempt the Following questions** **(07)**

a. Why we can't distinguish enantiomers by IR spectroscopy? **01**
b. Write the wavenumber range for free and H-bonded O-H group. **01**
c. Give the equation showing relation between wavenumber and force constant. **01**
d. Define spectroscopy. **01**
e. Give wavelength range for Far IR region. **01**
f. Give the examples of molecules which active in Raman but not in IR spectroscopy. **01**
g. Define Raman scattering. **01**

Q-2 **Attempt all questions** **(14)**

A Explain the sampling techniques used in IR spectroscopy. **07**
B Discuss the mechanism of Raman effect by quantum theory. **07**

OR

Q-2 **Attempt all questions** **(14)**

A Write a note on various factors affecting vibrational frequency. **07**
B Explain the mechanism of Raman scattering by classical theory. **07**

Q-3 **Attempt all questions** **(14)**

A Explain fundamental vibrations for IR spectroscopy. **05**
B Discuss the disadvantages of Raman spectroscopy over Infrared spectroscopy. **05**
C Give the applications of IR spectroscopy. **04**

OR

Q-3 A Explain the instrumentation of Dispersive IR spectroscopy. **05**
B Discuss the advantages of Raman spectroscopy over Infrared spectroscopy. **05**
C Explain resonance Raman technique. **04**

SECTION – II

Q-4 **Attempt the Following questions** **(07)**

a.	How one can increase population difference as per Boltzman Distribution Law equation?	**01**
b.	Define X-Ray Diffraction.	**01**
c.	Write equation of Larmor frequency for NMR spectroscopy.	**01**
d.	What do you mean by downfield field shift?	**01**
e.	Write any two examples of nuclei having integral spin value.	**01**
f.	Give the Bragg's equation and name of different terms involve in the equation.	**01**
g.	Give example of molecules in which shielding of proton take pace.	**01**

Q-5 **Attempt all questions** **(14)**

A	Discuss the various factors affecting on chemical shift in NMR.	**07**
B	Write a note on powder diffraction method in detail.	**07**

OR

Q-5

A	Explain types detectors used in X-ray diffraction.	**07**
B	Discuss the continuous wave NMR instrumentation.	**07**

Q-6 **Attempt all questions** **(14)**

A	Write a note on different monochromators used in X-ray spectrometer.	**05**
B	Explain spin-spin coupling mechanism for NMR in detail.	**05**
C	Write the applications of X-rays diffraction.	**04**

OR

Q-6 **Attempt all Questions**

A	Discuss the single crystal X-ray diffraction.	**05**
B	Write a note on chemical shift for NMR spectroscopy.	**05**
C	Draw labeled instrumental diagram of FT-NMR instrument.	**04**