

C.U.SHAH UNIVERSITY

Winter Examination-2021

Subject Name: Qualitative Optical Spectroscopic Method-I

Subject Code: 5SC03QSC1

Branch: M.Sc. (Chemistry)

Semester: 3

Date: 14/12/2021

Time: 02:30 To 05:30

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.
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SECTION – I

- Q-1 Attempt the Following questions (07)**
- a** Define spectroscopy **1**
 - b** Give any two applications of IR **1**
 - c** How will you distinguish p-methoxy and p-nitro acetophenone by IR spectroscopy? **1**
 - d** Why can't distinguish d and l-lactic acid by IR? **1**
 - e** Define Raman shift **1**
 - f** Give the examples of molecules which are active in Raman but not in IR spectroscopy. **1**
 - g** Define the Rayleigh scattering **1**
- Q-2 Attempt all questions (14)**
- a** Explain the theory of molecular vibrations. **07**
 - b** Explain mechanism of Raman effect by classical 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 quantum theory. **07**
- Q-3 Attempt all questions (14)**
- a** Draw the labeled instrumental diagram of dispersive IR spectroscopy. **05**
 - b** Give any five differences between the Raman and Infrared spectroscopy **05**
 - c** Explain the resonance Raman technique. **04**



OR

- Q-3** Attempt all questions (14)
a Explain the sampling techniques in IR spectroscopy. 07
b Explain the instrumental diagram of dispersive Raman spectroscopy. 07

SECTION – II

- Q-4** Attempt the following questions (07)
a Define the term: Equivalent proton 01
b What do you mean by anisotropic effect? 01
c Give any two limitations of x-ray techniques. 01
d What do you mean by down field and up field shift? 01
e Give any two examples of nuclei having nuclear spin $I = 0$. 01
f Define X- ray diffraction 01
g Give the name of Monochromators used in XRD. 01

- Q-5** Attempt all questions (14)
a Explain the spin-spin coupling or splitting of signal and causes for splitting of signal. 07
b Write a note on powder crystal diffraction method in detail. 07

OR

- Q-5** Attempt all questions (14)
a Explain Laue method of X-ray diffraction. 07
b Explain the CW-NMR (Continuous Wave) instrumentation in detail. 07

- Q-6** Attempt all questions (14)
a Explain the types of detectors used in X-ray diffraction. 07
b Explain the Spin-Lattice relaxation and shielding and deshielding of proton in NMR. 07

OR

- Q-6** Attempt all questions (14)
a Explain why TMS used as reference compound in NMR spectroscopy? 05
b Explain the coupling constant (J). 05
c Write a note on chemical shift in NMR. 04

