

C.U.SHAH UNIVERSITY

Summer Examination-2020

Subject Name: Qualitative Optical Spectroscopic Method - I

Subject Code: 5SC03QSC1

Branch: M.Sc. (Chemistry)

Semester: 3

Date: 27/02/2020

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 spectrum **1**
 - B** Why IR spectroscopy is known as vibrational-rotational spectroscopy? **1**
 - C** What do you mean by Rayleigh scattering? **1**
 - D** Why we can't distinguish enantiomers by IR spectroscopy? **1**
 - E** Define Raman scattering **1**
 - F** Give the examples of molecules which are active in Raman but not in IR spectroscopy. **1**
 - G** Why water is not used as solvent in IR spectroscopy? **1**
- Q-2 Attempt all questions (14)**
- A** Explain the fundamental vibrations 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 the instrumentation of IR spectroscopy. **05**
 - B** Discuss the advantages of Raman spectroscopy over Infrared spectroscopy **05**
 - C** Give the applications of IR spectroscopy. **04**

OR



- Q-3** Attempt all questions (14)
- A** Explain the sampling techniques in IR spectroscopy. 05
 - B** Discuss the disadvantages of Raman spectroscopy over Infrared spectroscopy 05
 - C** Give the applications of Raman spectroscopy. 04

SECTION – II

- Q-4** Attempt the Following questions (07)
- A** Give the Bragg's equation for x-ray diffraction. 01
 - B** What do you mean by deshielding? 01
 - C** What is x-ray techniques? 01
 - D** What do you mean by up field shift? 01
 - E** Give any two examples of nuclei having half-integral spin value. 01
 - F** Write any two applications of X-ray spectroscopy. 01
 - G** Define the term: Non-Equivalent proton 01
- Q-5** Attempt all questions (14)
- A** Discuss continuous wave NMR instrumentation in detail. 07
 - B** Explain the relaxation processes in NMR spectroscopy. 07

OR

- Q-5** Attempt all questions (14)
- A** Explain the diffraction of x-ray in detail. 07
 - B** Write a note on powder diffraction method in detail. 07
- Q-6** Attempt all questions (14)
- A** Discuss the single crystal X-ray diffraction. 05
 - B** Explain spin-spin coupling mechanism for NMR in detail. 05
 - C** Draw labeled instrumental diagram of FT-NMR instrument. 04

OR

- Q-6** Attempt all questions (14)
- A** Write applications of X-rays diffraction. 05
 - B** Explain the coupling constant (J). 05
 - C** Write a note on chemical shift in NMR. 04

