P-71

Total Pages : 3 Roll No. .....

MSCCH-509

Spectroscopy-I

M.Sc. Chemistry (MSCCH)

2nd Semester Examination, 2023 (June)

Time : 2 Hours] **Max. Marks : 70**

Note : This paper is of Seventy (70) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein. Candidates should limit their answer to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

SECTION–A
(Long Answer Type Questions)

Note : Section 'A' contains Five (05) long answer type questions of Nineteen (19) marks each. Learners are required to answer any Two (02) questions only.

(2×19=38)

1. (i) Define microstate. Calculate the number of microstate for p^1-configuration and p^2-configuration.

(ii) Describe the concept of polarizability in Raman scattering.

2. What is Raman spectra? Define stoke's and antistoke's line in Raman spectra.Write down the application of Raman Spectroscopy.

3. Detail the chemistry of electronic spectroscopy. Give the various types of transitions involved in this technique with one example of each case.

4. (i) Define what factors affecting the position of UV-bands.

(ii) How will you distinguish 1^0, 2^0 and 3^0 amines with the help of IR-spectroscopy? Discuss with example.

5. What is Michelson interferometer ? Discuss the difference between dispersive and FT-IR Spectrophotometer.

SECTION–B

(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Eight (08) marks each. Learners are required to answer any Four (04) questions only. (4×8=32)

1. Discuss effect of nuclear spin in vibrational spectroscopy.

2. Write a short notes on :

(i) Zeeman effect.

(ii) Isobestic point.

3. Explain the overtone and fundamental bands.

4. Discuss the reason for bathochromic shift in polyconjugated compounds.

5. What are P, Q and R branches of the vibration-rotation spectrum?

6. Discuss the rotational spectrum of Diatomic rigid rotator.

7. Explain Lambert's law with absorptivity of the substance.

8. (i) Define Heisenberg's Uncertainty Principle.

(ii) A cricket ball weighing l00 g is to be located within 0.1Å. What is the uncertainty in its velocity ? Comment on your answer. Plank's constant(h) = 6.626×10^{-34} Js.