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

MSCCH-509

Spectroscopy-I

M.Sc. Chemistry (MSCCH)

2nd Semester Examination, 2022 (June)

Time : 2 Hours] **Max. Marks : 80**

Note : This paper is of Eighty (80) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

SECTION–A

(Long Answer Type Questions)

Note : Section 'A' contains Five (05) long answer type questions of Twenty (20) marks each. Learners are required to answer any Two (02) questions only.

(2×20=40)

1. Explain Raman scattering in detail with respect to pure vibrational and pure rotational Roman spectra of a diatomic molecule.

2. Write note on :

(a) Bathochromic shift.

(b) Hypsochromic shift.

(c) Isobestic point.

3. Write note on :

(a) Degrees of freedom of polyatomic molecules.

(b) FT-IR.

4. Discuss the rotational spectrum of non-rigid rotator.

5. Write note on :

(a) Breakdown of the Born-Oppenheimer approximation.

(b) Hook's Law.

SECTION–B

(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Ten (10) marks each. Learners are required to answer any Four (04) questions only. (4×10=40)

1. Define electromagnetic spectrum and explain the characteristics of electromagnetic radiations.

2. Define microstate. Calculate the number of microstate for p^1 and p^2 configuration.

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

4. How will you distinguish 1°, 2° and 3° amine with the help of IR spectroscopy.

5. Discuss mutual exclusion rule along with its applications.

6. Write applications of UV-visible spectroscopy.

7. How bond angle and ring strain influence the vibrational frequency? Discuss with examples.

8. What is the effect of isotopic substitution on rotational spectra?