

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2022
(Third Semester)

Branch – CHEMISTRY

MOLECULAR SPECTROSCOPY & ITS APPLICATIONS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 Which one of the following is a chromophore?
(i) -OH (ii) -OR
(iii) -N=N- (iv) -NH₂
- 2 Bond order and force constant are related to each other in the following way.
(i) inversely proportional to each other (ii) directly proportional to each other
(iii) not related to each other (iv) relationship could not be defined
- 3 How many possible orientations can a nuclei with spin 1 can adopt when placed in an applied magnetic field?
(i) 1 (ii) 2
(iii) 3 (iv) 4
- 4 What is the ¹³C resonance frequency on a 600 MHz NMR spectrometer?
(i) 600 MHz (ii) 92 MHz
(iii) 60 MHz (iv) 150 MHz
- 5 The Mossbauer effect is based on
(i) Doppler effect (ii) Beer-Lamberts law
(iii) Mossier effect (iv) Spin effect

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a. How do solvents influence UV-Vis spectra? Explain.
OR
b. What type of electronic transitions is possible for each of the following compounds?
i. Cyclopentene ii. Acetaldehyde iii. Triethyl ether
- 7 a. Give a short account on Fermi resonance.
OR
b. Distinguish Stokes lines from and anti-stokes lines in Raman spectra.
- 8 a. In what way inductive effect affects the chemical shift value? Discuss.
OR
b. Write a note on spin-spin and spin-lattice relaxation.
- 9 a. What is off-resonance decoupling? What is its significance?
OR
b. Write a note on the factors which influence chemical shift in ¹³C NMR spectra.
- 10 a. Briefly write about the factors which affect the g value in ESR.
OR
b. Explain quadrupole splitting in a Mossbauer spectrum.

Cont...

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 6 = 30)

- 11 a Explain in detail the charge transfer spectra of inorganic compounds.
OR
b Discuss the principle of UV-Vis spectroscopy and different types of transitions.
- 12 a With a neat diagram explain the instrumentation of IR spectroscopy.
OR
b How is Raman spectroscopy used to analyse the structure of organic compounds? Explain.
- 13 a Write about nuclear overhauser effect.
OR
b Explain pulsed NMR technique.
- 14 a Discuss the salient features of 2D NMR.
OR
b Illustrate how NMR technique is used in the study the energy between Ligand and metal of exchange reactions in transition metal complexes.
- 15 a Give a detailed account on the instrumentation of ESR spectroscopy.
OR
b Write a note on i. Doppler shift ii. magnetic hyperfine splitting (3+3).

Z-Z-Z

END