



BBB-003-1104008

Seat No. _____

M. Sc. (Sem. IV) Examination

July - 2021

C(I)-402 : Inorganic Chemistry

(Inorganic Spectroscopy)

Faculty Code : 003

Subject Code : 1104008

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :** (1) Answer any five from all questions.
(2) All questions carry equal marks.

- 1** Answer the following **14**
- (a) What is Nuclear Quadruple Resonance?
 - (b) Discuss Zero field spitting in ESR.
 - (c) Discuss the difference between NMR and ESR.
 - (d) write the limitations of ESR.
 - (e) Discuss the use of Photoelectron Spectroscopy.
 - (f) Give the basic idea of Auger Electron spectroscopy.
 - (g) Write a note on selection rules of ESR.
- 2** Answer the following **14**
- (a) Give the equation to find out the energy of each state in ESR energy level diagram.
 - (b) Write a note on NMR.
 - (c) Define Nuclear Quadruple Resonance.
 - (d) Write a note on PES spectrum of Li.
 - (e) Give the basic principle of Photoelectron Spectroscopy.
 - (f) Discuss photoelectric effect and Ionization energy.
 - (g) What is Kremer's degeneracy in ESR.
- 3** Answer the following **14**
- (a) Discuss the relation between Koopman's Theorem and Ionization energy.
 - (b) Explain NQR techniques in detail.

- 4 Answer the following 14
(a) Discuss the PES spectrum of O₂ molecule and CO molecule.
(b) Define ESR. Discuss ESR theory with its limitations.
- 5 Answer the following 14
(a) Explain ESR spectrum of Mn²⁺(I=5/2).
(b) Discuss photoelectric spectrum with interpretation for simple molecules.
- 6 Answer the following 14
(a) Discuss the ESR spectrum of H₂· radical (One electron influenced by two equivalent protons).
(b) Explain NMR spectrum of ¹¹B.
- 7 Answer the following 14
(a) Explain Instrumentation techniques of ESR.
(b) What is Auger Electron Spectroscopy (AES), define Auger effect and Auger electron.
- 8 Answer the following 14
(a) Explain Hyperfine splitting in ESR.
(b) Explain the NQR spectra with each energy level of I=3/2.
- 9 Answer the following 14
(a) Discuss the NMR spectrum of ¹⁹F and its application in inorganic complexes.
(b) Explain the ESR spectrum of H-atom.
- 10 Answer the following 14
(a) Discuss the NQR spectra of Quadrupolar nucleus having I=3/2.
(b) Discuss the NMR shift reagent.
-