Seat No. _____

# HA-003-1104008

## M. Sc. (Sem. IV) Examination

**April - 2023**

## Inorganic Chemistry : C(I)-402

***(Inorganic Spectroscopy)***

**Faculty Code : 003**

**Subject Code : 1104008**

Time : $2\frac{1}{2}$ / Total Marks : **70**

**Instructions :**

(1) All questions are compulsory.

(2) All questions carry equal marks.

**1** Answer the following : **14**

(a) Define Electron Spin Resonance.

(b) What is Zero Field splitting in ESR.

(c) Discuss the difference between NMR and ESR.

(d) Explain, hydrogen bonding shifts the NMR signal down.

(e) Explain the PES spectrum of Li.

(f) Give the selection rules of ESR.

(g) Define Nuclear Quadruple Resonance.

(h) What do you mean by Nuclear Quadruple Resonance ?

(i) Give the basic idea of PES.

(j) Give the name of nuclei other than proton which can be studied by NMR.

**2** Answer the following (Any Two) **14**

(a) Explain NQR techniques in detail.

(b) The applications of photo electronic spectra of transition metal complexes.

(c) What is Auger Electron Spectroscopy (AES), define Auger Effect and Auger Electron.

**3** Answer the following (any Two) **14**

(a) Discuss the ESR spectrum of $VO_2^+$.

(b) Discuss the PES spectrum of $O_2$ molecule and CO molecule.

(c) Discuss NMR spectra of $^{31}P$.

(d) Discuss the ESR spectrum of $Mn^{+2}$ (I=5/2)

**4** Answer the following : **14**

(a) Write short note on 'g' value and factor affecting it in ESR.

(b) Write note on NMR shift reagent.

**5** Answer the following : **14**

(a) Discuss the NMR spectra of $^{11}B$ and its application in inorganic complexes.

(b) Discuss the ESR spectrum of $H_2^+$ -ion.

**OR**

**5** Answer the following : **14**

Discuss the NQR spectra of Quadrupolar nucleus having I=3/2 and determine energy of each energy level.

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