

**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034****M.Sc. DEGREE EXAMINATION – CHEMISTRY****SECOND SEMESTER – APRIL 2024****PCH2MC02 – COORDINATION CHEMISTRY**

Date: 06-04-2024

Dept. No.

Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

SECTION A – K1 (CO1)**Answer ALL the questions****(5 x 1 = 5)****1 Answer the following.**

- a) Differentiate the absorption spectra of complexes with and without Jahn Teller distortion.
- b) Give an example for complementary reaction.
- c) Write any two characteristics of charge transfer spectra.
- d) Differentiate between ENDOR and ELDOR.
- e) Mention any two functions of metals in metalloproteins.

SECTION A – K2 (CO1)**Answer ALL the questions****(5 x 1 = 5)****2 Fill in the blanks.**

- a) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ complex is having _____ B.M. of spin only magnetic moment.
- b) Isotactic polypropene is prepared by using _____.
- c) A Tanabe-Sugano diagram is obtained by plotting _____.
- d) Only one line found in the halogen NQR spectrum of K_2PtCl_6 is consistent with _____ structure.
- e) Ferritins play a key role in _____.

SECTION B – K3 (CO2)**Answer any THREE of the following****(3 x 10 = 30)**

- 3 Explain the application of crystal field theory in ionic radii, hydration enthalpy and lattice energy.
- 4 Deduce the mechanism of photorearrangement reactions with an example.
- 5 How is IR spectroscopy useful for the detection of a) terminal and bridging carbonyls, b) linkage isomers of NO_2^- and CN^- ?
- 6 How are Mossbauer spectra useful in determining the oxidation state of atoms?
- 7 Explain the structure, mode of action and functions of Horseradish Peroxidase.

SECTION C – K4 (CO3)**Answer any TWO of the following****(2 x 12.5 = 25)**

- 8 What is meant by LCAO? Draw and write the wave functions of various orbitals involved in LCAO method employed to explain the bonding in coordination complexes.
- 9 Discuss the mechanism of inner sphere mechanism of electron transfer reactions.

10	With a suitable example, explain the electronic spectrum of d^3 and d^7 complexes using Orgel diagram.
11	Discuss Mossbauer spectrum of any three coordination complexes.
SECTION D – K5 (CO4)	
	Answer any ONE of the following (1 x 15 = 15)
12	a) Represent schematically the d orbital splitting in the case of d^6 system considering both low spin and high spin octahedral complexes. b) How does valence bond theory determine hybridization, geometry and magnetic nature of the coordination complex? Give a suitable example. (6 + 9)
13	Interpret the structure and functions of hemoglobin.
SECTION E – K6 (CO5)	
	Answer any ONE of the following (1 x 20 = 20)
14	How are the following metal complexes investigated using ESR experiments? (i) $[\text{Mo}(\text{CN})_8]^{3-}$ (ii) bis(salicylaldimine)Cu(II) complex. (10 + 10)
15	a) Write a note on the electronic spectra of lanthanide complexes. b) Explain the biological functions of azurin and stellacyanin. (10 + 10)
