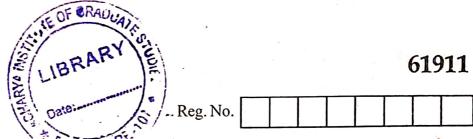
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II Semester M.Sc. Degree Examination, November - 2022

CHEMISTRY

Inorganic Chemistry - II (CBCS 2019-20 Scheme)

Paper: Ch - 201

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

Answer question No.1 and any Five of the remaining.

Answer any Ten of the following.

 $(10 \times 2 = 20)$

- 1. a) What is chelate effect?
 - b) Depict the bonding in metal dihydrogen complexes.
 - c) How are terminal and bridging carbonyls distinguished by IR-spectroscopic techniques.
 - d) What are the factors that favour low coordination number complexes?
 - e) Give the postulates of crystal field theory.
 - f) What is stereochemical nonrigidity? How is it detected?
 - g) Deduce the total number of microstates for V²⁺ and Ni²⁺
 - h) Why is the Mncl, solution feebly coloured?
 - i) Obtain the ground terms for d³ metal ion.
 - j) Calculate the spin only magnetic moment for [Fe(CN₆)]⁴-and CoCl₄²-
 - k) What is spin crossover?
 - 1) What is Kasha's rule?

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2. a) Discuss the bonding in metal isocyanide complexes.

(3+4+3=10)

- b) Describe the stability constant determination of a metal complex by polarographic method.
- c) What are the possible ways of binding No to metal? Describe the bonding in them.
- 3. a) How do nature of metal ion and ligand affect the stability of metal complexes. (5+5=10)
 - b) Describe the crystal field splitting of d orbitals in tetrahedral and trigonal bipyramidal field. Why is crystal field of tetrahedral complex lower than octaheadral complexes.
- 4. a) Discuss the factors influencing CFSE. Calculate CFSE of $[Co(NH_3)_6]^{3+}$ (Given pairing energy = 21000 cm⁻¹ and Δ_0 = 29500 cm⁻¹) (4+3+3=10)
 - b) Construct the MO diagram of $[CoCl_4]^2$ with only σ bonding involved.
 - c) On the basis of CFT, explain the colour of transition metal complexes.
- 5. a) What is Nephelauxetic effect? Give any two evidences for it. (4+3+3=10)
 - b) Explain the selection rules in electronic spectroscopy.
 - c) How do ³P and ³F free ion terms of a d² metal ion get transformed in an octahedral complex. Assign the transitions.
- 6. a) Sketch the Orgel diagram of a d⁴ system. Discuss the merits of Tanabe-Sugano energy level diagram as compared to Orgel diagram. (4+3+3=10)
 - b) Describe briefly on the charge transfor transitions exhibited by metal complexes.
 - The electronic spectrum of an octahedral cr(111) complex exhibits three absorption bands at 16000,17000 and 33000 cm⁻¹. Assign these transitions. Calculate 10 Dq, B¹ and β (B=918 cm⁻¹ for chromium(111)).



- 7. a) Describe the magnetic moment measurement of a complex by gouy method. Why is $Hg[Co(SCN)_4]$ used as a calibrant? (5+5=10)
 - b) What is spin-orbit coupling? How does it affect the magnetic moments of transition metal complexes?
- 8. a) With suitable examples discuss the photosubstitution reactions occurring in metal complexes. (4+6=10)
 - b) Write breifly on:
 - i. Diamagnetic Correction
 - ii. Jahn-Teller Effect

