



THE AMERICAN COLLEGE, MADURAI

(An Autonomous Institution Affiliated to Madurai Kamaraj University)

Re-accredited (2nd Cycle) by NAAC with Grade "A", CGPA – 3.46 on a 4-point scale

Backlog Arrear Examination, March 2021

PGC 4404/4424/4434

INORGANIC CHEMISTRY – II

Max:75 marks

Time : 3 hrs

Answer any 5 questions

(5X15=75)

- (a) Discuss the utility of NQR in getting structural information of compounds?

(b) Give an account of CT spectra. (7+8)
- (a) Illustrate the use of EPR in the study of Cu(II) complexes?

(b) Draw all possible structures for the compound $[\text{Fe}_2(\text{CO})_8\text{H}]^-$. Apply suitable spectroscopic techniques to derive the correct structure? (7+8)
- (a) Write a note each on (i) ACFT (ii) Nephelauxetic effect (4+4)

(b) Give the VB descriptions for the following complexes with their structures

(i) $[\text{Cr}(\text{CN})_6]^{3-}$ (ii) $\text{Ni}(\text{CO})_4$ (diamagnetic) (3+4)
- (a) Predict from each of the following pairs the species having **higher** property indicated. Justify your answer.

i) wavelength of absorption : FeCl_6^{3-} or $\text{Fe}(\text{H}_2\text{O})_6^{3+}$

ii) oxidising nature: $\text{Co}(\text{NO}_2)_6^{4-}$ or $\text{Co}(\text{NO}_2)_6^{3-}$

iii) crystal field splitting: H_2O or OH^-

iv) CFSE: $\text{Cr}(\text{NH}_3)_6^{3+}$ or $\text{Mo}(\text{NH}_3)_6^{3+}$

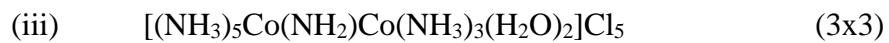
v) μ_{eff} value $\text{Co}(\text{H}_2\text{O})_6^{2+}$ or $\text{Co}(\text{CN})_6^{4-}$

(b) In a crystal of Copper (II) fluoride all Cu-F bond distances are not equal. Explain with the energetics involved in this distortion. (10+5)
- (a) Account for the following.

(i) $\text{Ni}(\text{en})_3^{2+}$ is nearly 10^{10} times more stable than $\text{Ni}(\text{NH}_3)_6^{2+}$.

(ii) $\text{Log}\beta_2$ values of Ni^{2+} complexes with oxine, 2-methyl oxine and 4-methyl oxine are 21.4, 17.8 and 22.3 respectively. (oxine is 8-hydroxy quinoline) (6)

(b) What is trans effect. Discuss the theories of trans effect. (9)
- (a) Draw the structure of the following complexes and give their IUPAC names. Also draw the possible isomeric forms.



(b) Give a comparative account of 3d, 4d and 5d transition elements. (6)

7. (a) Explain inner and outer sphere electron transfer reactions using suitable example.

(b) Write on stereoisomerism in coordination compounds. (7+8)
