[This question paper contains 2 printed pages.]

Your Roll No.....

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Sr. No. of Question Paper : 7862

Unique Paper Code : 2173540024

Name of the Paper : DSE: Coordination Chemistry, Reaction Mechanism and Spectral Properties

Name of the Course : **B.Sc. (Prog.)**

Semester : VIII

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **four** questions in all.
3. **All** questions carry equal marks.

1. (i) Discuss mechanism of Hydrolysis reaction with one example of octahedral complex. (5)

   (ii) Utilizing the trans effect, write synthesis of trans-$[Pt(NH_3)(NO_2)Cl_2]^-$ from $[PtCl_4]^{2-}$. (5)

   (iii) Write differences between Dissociative (D) mechanism and Associative (A) mechanism in octahedral complex. (5)

2. (i) Give the mechanism of the following reaction :

   $[Co(NH_3)_6]^{3+} + [Ru(NH_3)_6]^{2+} \rightarrow [Co(NH_3)_6]^{2+} + [Ru(NH_3)_6]^{3+}$

   Also, explain why this reaction is slow. (5)

   (ii) The ligand transfer is not a requirement of the inner sphere mechanism. Justify this statement with an example. (5)

   (iii) Discuss remote attack and adjacent attack with example. (5)

3. (i) Draw the molecular orbital energy level diagram for π-bonding in octahedral complexes? (5)

P.T.O.

(ii) What are the main features of ligand field theory? (5)

(iii) Discuss higher charge on metal causes greater crystal field splitting. (5)

4. (i) What are π-donor and π-acceptor ligands? How do these ligands affect the crystal field splitting in complexes? (5)

(ii) How does covalent bonding in complexes have been explained by ligand field theory? (5)

(iii) What are the shortcomings of crystal field theory? (5)

5. (i) Discuss Metal to Ligand Charge transfer (MLCT) transitions in an octahedral complex. (5)

(ii) Discuss Tanabe – Sugano diagram of d^2 system. (5)

(iii) What is Laporte's Selection rule. Discuss relaxation in Laporte's selection rule. (5)

6. (i) The absorption spectrum of $[Cu(H_2O)_6]^{2+}$ exhibit two closely overlapping band rather than a single band. Discuss. (5)

(ii) Write differences between Orgel diagram and Tanabe- Sugano diagram. (5)

(iii) Discuss Nephelauxetic effect. (5)