Reg. No..... Name.....

M. Sc. DEGREE END SEMESTER EXAMINATION APRIL 2017

SEMESTER – 2: CHEMISTRY / APPLIED CHEMISTRY

COURSE: 15P2CHET05-15P2CPHT05, COORDINATION CHEMISTRY

(For Supplementary - 2015 Admission /2014 Admission)

Time: Three Hours Max. Marks: 75

Section A

*(Answer any **Ten** questions, Each question carries 2 marks)*

1. Arrange the following complex ions in the decreasing order of Δ_o value: $[Cr(CN)_6]^{3-}$, $[CrCl_6]^{3-}$, $[Cr(NH_3)_6]^{3+}$. Justify your answer.

2. The ionic radii of M^{2+} ions are expected to decrease smoothly from Ca^{2+} to Zn^{2+}. But the change is not regular. Why? Explain.

3. $[Ti(H_2O)_6]^{3+}$ exhibits a double humped d-d spectrum. Why?

4. Derive the ground state term symbols for Fe^{2+} and V^{3+} ions

5. The energy of charge transfer transition in $[Co(NH_3)_5X]^{2+}$ (X=halide ion) decreases in the order: $F^- > Cl^- > Br^- > I^-$. Why?

6. Explain Curie and Curie-Weiss laws

7. The inert complexes are not thermodynamically stable and labile complexes are not necessarily thermodynamically unstable. Justify with examples

8. The aquation reaction $[Co(NH_3)_4Cl_2]^+$ is faster than that of $[Co(NH_3)_5Cl]^{2+}$. Why?

9. The rate of electron transfer between $Ru(o-phen)_3^{2+¿¿}$-$Ru(o-phen)_3^{3+¿¿}$ requires no change in energy eventhough the partners are chemically distinguishable. Explain

10 What are macrocylic ligands?

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11 Explain the isomerism exhibited by an octahedral complex of the formula $MA_2B_2C_2$ where M is a metal and A, B and C are monodentate ligands

12 Discuss the use of lanthanide complexes as shift reagents

13 Explain the stable oxidation states of europium

(2 x 10 = 20)

Section B

*(Answer any **Five** questions, Each question carries 5 marks)*

14. What are the experimental evidences for metal-ligand covalency in metal complexes?

15. With the help of Orgel diagram, explain the transitions observed for Cr^{3+} in an octahedral field.

16. Draw and explain the crystal field splitting of 'd' orbitals in square planar and trigonal bipyramidal geometries

17. What is temperature independent magnetism?

18. Explain the inner sphere mechanism of electron transfer reactions.

19. How *cis* and *trans* isomers of $[PtCl_2(NH_3)NO_2]^-$ are prepared from $[PtCl_4]^{2-}$?

20. Discuss the reasons for optical isomerism in octahedral complexes. What do you mean by resolution of optically active complexes?

21. Compare the electronic spectra of actinides with that of lanthanides and transition metals.

(5 x 5 = 25)

Section C

(*Answer any **Two** questions, Each question carries 15 marks)*

22. Explain the molecular orbital theory of the bonding in the complex $[Co(NH_3)_6]^{3+}$

23. Explain the selection rules for electronic spectroscopy. How can Ni(II) complexes in various geometries be distinguished by their electronic spectra?

24. Explain SN^1CB substitution nucleophilic unimolecular conjugate base reaction with an example.

25 Describe how absolute configurations of metal complexes are determined by ORD and circular dichorism.

(15 x 2 = 30)

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