

Name :
Roll No. :
Invigilator's Signature :

CS/M.TECH(LT)/SEM-1/MOLT-105/2011-12

2011

ADVANCED COORDINATION CHEMISTRY

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer any *seven* questions. $7 \times 10 = 70$

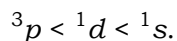
1. Mention the following statements *right* or *wrong* :

$10 \times 1 = 10$

- i) Tris (acetylacetonato) chromium (III) is a cationic complex.
- ii) Tris (8-quinolinato) Iron (III) is an anionic complex.
- iii) Hexaaminecobalt (III) chloride is a nonionic complex.
- iv) M—ONO, Nitro ligand complexed with Metal Ion.
- v) CO (II) Cl_2 is a reducing agent.
- vi) Cr (II) ion is a stable ion.
- vii) $1s < 2s < 2p < 3s < 3p < 4s < 3d < 4p < 4d < \dots$ is right ascending order for electron accommodation in atoms.



viii) The energy levels for p^2 electronic configuration are :



ix) Cu (I) ion is a d^9 ion.

x) Example of d^4 ion is V(III) ion.

2. Clarify your answer for each of the aforementioned corrects statements. 10 × 1 = 10

3. Explain the following terms : 10

i) LFER

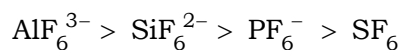
ii) LFSE

iii) LCAO combination of atomic orbitals

iv) Russell-Saunders coupling

v) Jahn-Teller distortion of octahedral complexes.

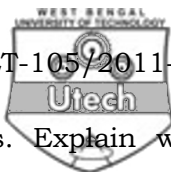
4. Define outer inner orbital complexes with example. The lability of outer orbital complexes decreases in the following order :



Give reasons of your answer.

4 + 6

5. V(II) ion and Cr (III) ion — both being $3d^3$ ion, they should exhibit the similar complex properties. But it is found that the complexes of H_2O , F^- , Cl^- , SCN^- , NH_3 , CN^- etc. all are inert whereas all the complexes of V(II) ion are labile but $\text{V}(\text{CN})_6^{4-}$ is inert. Explain this statement. 10



6. Define Lability and Inertness of complexes. Explain why $\text{Co}(\text{NH}_3)_6^{3+}$ is unstable but inert, whereas $\text{Ni}(\text{CN})_4^{2-}$ is stable but labile. 4 + 6
7. a) Discuss the reasons of colour formation in transition metal compounds.
b) How does it differ from organic coloured compounds ? 6 + 4
8. Tanning of hides and skins with basic chrome compounds is thermodynamic / kinetic property of the same metal. Discuss with salient reasons. 10
9. It is generally found that $3d^1$ to $3d^4$ ions have the propensity to form octahedral complexes whereas $3d^0$ ions or non-transition metal ions tend to form only tetrahedral structure compounds; simultaneously from $3d^6$ to $3d^9$ ions behave to form more square planar complexes among many of the ligand geometry. Narrate your answer with your own reasons. 10

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