SUBJECT CODE: CH/MC/IC54
B.Sc. DEGREE EXAMINATION, NOVEMBER 2011
BRANCH IV- CHEMISTRY
FIFTH   SEMESTER
REG.NO ……………………..

COURSE   : MAJOR CORE
PAPER   : INORGANIC CHEMISTRY-III
TIME   : 30 MINUTES   MAX.MARKS : 30

SECTION – A   (30x1=30)
ANSWER ON THE QUESTION PAPER ITSELF
Answer all the questions

I. Choose the correct answer:

1. What is the name of the coordination compound with the formula $[Cr(H_2O)_4Cl_2]Cl$?
   (a) quadradichlorochromium(III) chloride
   (b) tetraquabischlorochromium(IV) chloride
   (c) tetraaquadichlorochromium(III) chloride
   (d) tetrawaterdichlorochromium(III) chloride

2. The EAN of the complex $K_3[Fe(CN)_6]$ is
   (a) 34   (b) 32   (c) 35   (d) 36

3. Based on the crystal field theory, the metal-ligand interaction is
   (a) covalent in nature   (b) metallic in nature
   (c) partially electrostatic in nature   (d) purely electrostatic in nature

4. Ferrochrome is an alloy containing
    (a) 75% Chromium and 25% iron   (b) 50% Chromium and 50% iron
    (c) 25% Chromium and 75% iron   (d) none of the above

5. The outer electronic configuration of actinium is
    (a) $5f^0 6d^1 7s^1$ (b) $5f^0 6d^2 7s^1$ (c) $5f^0 6d^1 7s^2$ (d) $5f^1 6d^1 7s^2$

6. Ferrocene undergoes Friedel Crafts catalyzed acetylation readily to give.
    (a) only one 1, 1' –disubstituted compound   (b) two 1, 1' –disubstituted compound
    (c) three 1, 1'–disubstituted compound   (d) none of the above

II. State whether True or False:

7. When a complex is anionic, the name of the central metal ion ends with 'ium'.
8. Alizarin is the indicator used in the EDTA titrations.
9. The formula to calculate the magnetic moment based on VBT do not take into account theorbital contribution.
10. Only the transition metal ions which have completely filled d- orbitals are colored.
11. The color of some of the lanthanides and actides are due to d-d transition.
12. $C_5H_5^-$ anion does not obey Huckel's rule of aromaticity.

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III. Match the following:

13. Sidgewick   a) Actinide
14. Valence bond theory   b) Manganese
15. Pyrolusite   c) 18 electron rule
16. Gadolinium   d)Zero oxidation state
17. Lawrencium   e)Inner orbital complexes
18. $[Fe(CO)_5]$ f)Lanthanide

IV. Fill in the blanks:

19. The extension of lobes of d orbitals ie., the expansion of d- electron charge cloud is known as----------------------------
20. The geometry of the M-EDTA complex is ---------------------
21. Scheelite is the ore of --------------------
22. $MnO_4 + Mn^{2+} + 2H_2O \rightarrow$ ------------------------
23. In actinide series the elements beyond uranium are called as ---------------------- because they are artificially prepared through nuclear reactions.
24. $H_2C=CH-CH=CH_2 + Fe(CO)_5 \rightarrow$ ----------------------

V. Answer in one or two sentences:

25. What are chelating ligands?

26. What are inner orbital complexes?

27. Since the electrode potentials of the transition metals are very high, they should be good reducing agents. But actually they are not. Why?

28. What are actinides? Give the general electronic configuration of actinides.

29. What is meant by hapticity of a ligand? How is it designated?

30. What are π-Acids?

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COURSE   : MAJOR CORE
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TIME   : 2½ HOURS   MAX.MARKS : 70

SECTION – B   **(5x6=30)**
Answer any five questions:

1. Briefly discuss the quantitative applications of coordination compounds
2. Give a brief account of optical isomerism in 6-coordinate complexes.
3. Account for the following.
   i) Tetrahedral complexes of the type Ma_2b_2 do not exhibit geometrical isomerism whereas
      Square planar do. Explain.
   ii) Square planar complexes do not exhibit optical isomerism but tetrahedral complexes
       show geometrical isomerism. Why? Which is the exceptional square planar complex
       that exhibit optical isomerism?
4. How will you extract Titanium from Ilmenite ore?.
5. Write a note on oxidation reactions of $KMnO_4$ under acidic, alkaline and neutral
   conditions.
6. How will you separate lanthanides using ion exchange chromatography?
7. Discuss the structure of $Fe_2(CO)_9$

SECTION – C   **(2 x 20 = 40)**
Answer any two questions:

 8. a) What are the basic principles of Crystal field theory? Give an account of crystal field
        splitting in octahedral complexes.   (8 marks)
    b) State John Teller theorem. Discuss John Teller effect taking an example.   (8 marks)
    c) Give a brief account of qualitative and quantitative applications of DMG.   (4 marks)

9.   a) What are spectrochemical series? Explain high spin and low spin complexes in terms
        of spectro chemical series.   (8 marks)
     b) What are crystal field stabilization energies? Calculate Crystal Field Stabilization
        Energies for tetrahedral complexes.   (12 marks)

10. a) How will you extract chromium from Chromite ore?   (8 marks)
    b) Discuss the structure of Ziese's salt.   (6 marks)
    c) What is lanthanide contraction? What are its consequences?   (6 marks)

11. a) How will you extract thorium from monazite sand?   (8 marks)
    b) Give two preparation methods, properties and the structure of $Ni(CO)_4$.   (6 marks)
    c) Give a comparative account of oxides of V, and Mn group metals.   (6 marks)

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