STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted during the academic year 2004 –05 & thereafter)

SUBJECT CODE: CH/MC/IC54

B.Sc. DEGREE EXAMINATION, NOVEMBER 2009
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. The complex compounds formed by the association of one or more molecules of ammonia with metal cations are called
   (a) Mohr's salt (b) Amines (c) Ammines (d) None of these

2. An example for neutral bidentate ligand is
   (a) Ethylenediamine (b) Triethylamine (c) Oxalate ion (d) Glycinate ion

3. The valence of Fe in $K_3[Fe(CN)_6]$ is
   (a) 2 (b) 3 (c) 4 (d) 6

4. The most stable oxidation state of titanium is
   (a) +1 (b) +2 (c) +3 (d) +4

5. Wolframite is a mixture of
   (a) Calcium and manganese tungstates (b) Copper and manganese tungstates
   (c) Iron and manganese tungstates (d) Lead and manganese tungstates

6. The lanthanide with $4f^7 5d^1 6s^2$ configuration is
   (a) Neodymium (b) Gadolinium (c) Samarium (d) Terbium

7. Which one of the following is not an actinide
   (a) Neptunium (b) Americium (c) Curium (d) Cerium

8. The synthetic lanthanide is
   (a) Gd (b) Pm (c) Pr (d) Tb

9. The structure of $Fe(CO)_5$ is
   (a) Square pyramidal (b) Trigonal bipyramidal
   (c) Trigonal planar (d) Square planar

10. Which of the following is not an organometallic compound
    (a) $Al(CH_3)_3$ (b) $(C_2H_5)_4Pd$ (c) $B(OCH_3)_3$ (d) $Zn(C_2H_5)_2$

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II. Say True or False:

11. The IUPAC name of $K_4[Mo(CN)_8]$ is potassium octacyanomolybdate(IV).
12. EDTA is a tetradentate ligand.
13. All d-block elements do not show variable oxidation state.
14. Lu^{3+} does not contain any unpaired electron, so does not show paramagnetism.
15. Nickel carbonyl has a square planar structure.

III. Match the following:

16. Sidgwick	(a) Tungsten
17. Weak field	(b) Radioactive
18. Scheelite	(c) $(л\text{-}C_5H_5)_2Co$
19. Actinides	(d) Coordinate bond
20. Metallocene	(e) High spin

IV. Fill in the blanks:

21. The coordination number of the complex $[Co(NH_3)_3(H_2O)Cl_2]Br_2$ is ————.
22. The ion that can be detected by the use of oxine reagent is ————.
23. Oxidation state of 'Mn' vary from ——— to ————.
24. The most abundant lanthanide is ————.
25. In metal carbonyls CO molecules act as ———— ligands.

V. Answer in one or two sentences:

26. Calculate the EAN of Co in $[Co(NH_3)_6]^{3+}$.

27. Give the structure of DMG.

28. Mention the uses of titanium.

29. Write the name and electronic configuration of $_{95}Am$.

30. What are л- acceptor ligands.

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TIME : 2½ HOURS **MAX.MARKS : 70**

SECTION – B **(5x6=30)**

Answer any five questions:

1. Explain the optical isomerism in octahedral complexes.
2. Describe the EDTA method of determination of hardness of water.
3. How is vanadium extracted from vanadinite.
4. What is lanthanide contraction? What are its important consequences?
5. Discuss the preparation, chemical properties and structure of $Mn_2(CO)_{10}$.
6. Give a comparative study of chrominum group metals.
7. Write short notes on organolithium compounds.

SECTION – C **(2 x 20 = 40)**

Answer any TWO questions:

8. (a) Explain the magnetic properties shown by $K_4[Fe(CN)_6]$ and $K_3[FeF_6]$, on the basis of Pauling's theory. (8)
   (b) State and explain Jahn-Teller effect. (8)
   (c) Write short notes on spectrochemical series. (4)

9. (a) Describe the crystal field splitting of d orbitals of a transition metal in an octahedral and tetrahedral field. (10)
   (b) Draw the geometrical isomers of $[Pt(NH_3)_2Cl_2]$ and $[Co(NH_3)_4(NO_2)_2]NO_3$. (5)
   (c) Discuss the separation of lanthanides by ion-exchange method. (5)

10. (a) Give an account of the extraction uranium from pitchblende. (10)
    (b) Explain the structure and bonding in ferrocene. (10)

11. (a) Discuss Werner's theory of coordination compounds. (8)
    (b) Compare lanthanides and actinides. (6)
    (c) Discuss the structure of $Cr(CO)_6$ and $Co_2(CO)_8$. (6)