Exam. Code : 103204
Subject Code : 1342

B.A./B.Sc. 4th Semester

CHEMISTRY

(Inorganic Chemistry-III)

Time Allowed—3 Hours] [Maximum Marks—35

PART—A

Note :– **All** the questions are compulsory. Each question carries **1** mark. The maximum length of answer can be one-third of a page.

1. Write down the IUPAC name of following compounds :
   (a) $[Pt(NH_3)_4(NO_2)Cl]SO_4$
   (b) $[Co(en)_2Cl_2]Cl$
2. Calculate the EAN in the following compounds :
   (a) $[Cr(NH_3)_6]^{3+}$
   (b) $[Cu(CN)_4]^{3-}$
3. Name the types of isomerism exhibited by the following isomers and also draw all the possible isomers :
   (a) $Co(NH_3)_5Cl]SO_4$
   (b) $[Co(NH_3)_6][Cr(CN)_6]$
4. What is Latimer diagram ?
5. La, Gd and Lu show only +3 oxidation state whereas other lanthanides can exhibit +2 and +4 oxidation states, why ?

6. Define oxidation and reduction in terms of electron transfer and change in oxidation number.
7. What are actinides ? Why are they so called ?
8. Draw the structure of metalloporphyrin ring.

PART—B

Note :– Attempt any **two** questions from each section. Each question carries **4.5** marks. The maximum length of answer can be up to 5 pages.

SECTION—I

9. How does Valence Bond Theory account for the following:
   (a) $[Fe(CN)_6]^{4-}$ is diamagnetic while $[Fe(CN)_6]^{3-}$ is paramagnetic.
   (b) $[NiCl_4]^{2-}$ is paramagnetic and tetrahedral
   (c) $[Ni(CO)_4]$ is diamagnetic and tetrahedral.
10. Discuss acid-base reactions, complex formulation reaction, ammoniation and ammonolysis reaction in liquid ammonia.
11. Octahedral complexes of cobalt (III) have general formula $CoCl_m.nNH_3$. What different values of m and n are possible ? Which complex (one mole) would give two mole of AgCl with $AgNO_3$? Assign proper structure to the compounds.

SECTION—II

12. (a) What is lanthanide contraction ? Discuss the cause of lanthanide contraction and its effects.
    (b) Zr and Hf have almost similar properties, why ?

13. What is Pourbaix diagram ? To what use are they put ? Explain giving examples.
14. Explain the Frost diagram of Manganese in acidic medium?

SECTION—III

15. Discuss the role of alkali and alkaline earth metal ion in biological system.
16. Compare the following properties between the actinides and lanthanides :
    (a) Oxidation state
    (b) Magnetic properties
    (c) Radioactive nature
17. Define oxy and deoxyhemoglobin. What are the effects on geometry of heme group during oxy and deoxyhemoglobin ?