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Total No. of Pages : 02

Total No. of Questions : 19

M.Sc (Chemistry) PIT (Sem.-1)

BASIC INORGANIC CHEMISTRY

Subject Code : CHL-401

Paper ID : [51140]

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying FIVE marks each and students have to attempt ALL questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write down the name of the following complex :

   $[CuCl_2(CH_3NH_2)_2]$

2. Write down the formula of the complex :

   Hexaamminecobalt(III) chloride

3. Starting from ammonium chloroplatinate how will you prepare cis- and trans-$[Pt(NH_3)_2Cl_2]$?

4. "Of the two salts CrF2 and MnF2, one is octahedral and the other is distorted octahedral." Distinguish the two salts with proper explanation.

5. Copper (II) acetate mohydrate shows unusually low magnetic moment at room temperature- Explain.

6. $[FeF_6]^{3-}$ is colourless but $[Fe(SCN)]^{3-}$ is intense red coloured-Explain.

7. Applying 18-electron rule, establish the molecular formula of the compound having impirical ratio, $Cr : NO : C_5H_5^- = 1 : 2 : 1$

8. What are the units of radioactivity?

9. Give an example of heteroatomic metal cluster and hexanuclear metal cluster.

10. What do you mean by inner sphere redox reaction? Give example.

SECTION-B

11. What do you mean by isolobal relationship? Explain how it can be used in the synthesis of new molecules.

12. Write a short note on face centered cubic lattice (fcc) and Schottky defect.

13. With appropriate reasoning, arrange the following complexes in the increasing order of CO wave number (ν_{co}) in IR spectra:

$$[V(CO)_6]^-, [Ti(CO)_6]^{2-}, [Cr(CO)_6], [Mn(CO)_6]^+$$

14. The observed magnetic moment for $[CoI_4]^{2-}$ is 5.0 B.M while its spin only value is 3.92 B.M. Explain the anomaly.

15. Calculate the CFSE for following metal complexes :

    a) $[MnI_4]^{2-}$

    b) $[Fe(CN)_6]^{4-}$

16. Write a short note of 'Hall potential'. Define Lorentz number.

SECTION-C

17. What do you mean by F-centers? How does it influence the colour and electrical conductivity of the ionic crystals? Explain electrical conductivity of conductors in the light of band theory of metals.

18. Calculate the ground state term symbol for d^7 configuration and draw the Orgel diagram for the same in octahedral and tetrahedral field. Why the d^8-system gives the most favourable situation for the square planar complex formation?

19. What is the equation of balance involved in the determination of *styx* number of borane? Draw the structure of borane B_6H_{10} and B_3H_9 having *styx* number 4220 and 3003 respectively. State the factors controlling Racah interelectronic parameters.