(6 pages)

Reg. No. : .....

Code No. : 30009 E **Sub. Code : AMCH 61**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2024.

Sixth Semester

Chemistry — Core

INORGANIC CHEMISTRY — III

(For those who joined in July 2020 only)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The IUPAC name of $K_3[Al(C_2O_4)_3]$ is

   (a) Potassium trioxalato aluminium (III)

   (b) Potassium tri oxalato aluminate (II)

   (c) Potassium tri oxalato aluminate (III)

   (d) Potassium tris oxalato Aluminate (III)

2. In which compound the oxidation number of the metal ion is zero

   (a) $K_4[Fe(CN)_6]$ (b) $[Fe(CO)_5]$

   (c) $[Fe(CN)_3(NH_3)_3]$ (d) $[FeCl_6]^{3-}$

3. Which of the following cation is coloured in aqueous solution?

   (a) Cu^+ (b) Zn^{2+}

   (c) Ti^{4+} (d) Ni^{2+}

4. Which of the following complex is paramagnetic?

   (a) $[CoF_6]^{3-}$ (b) $[Co(NH_3)_6]^{3-}$

   (c) $K_4[Fe(CN)_6]$ (d) $[Co(CN)_6]^{3-}$

5. In ironpenta carbonyl the valency of iron is

   (a) 2 (b) 0

   (c) 3 (d) 5

6. $[Pt(NH_3)_4]^{2+}$ on treatment with Cl^- gives the product of $[Pt(NH_3)_2Cl_2]$. It is a

   (a) cis - isomer

   (b) trans isomer

   (c) mixture of cis and trans

   (d) none of the above

7. EAN of Mn in $Mn_2(CO)_{10}$ is

(a) 33 (b) 35

(c) 36 (d) 37

8. In metal nitrosyl the number of electrons given by each nitric oxide molecule is

(a) 0 (b) 1

(c) 2 (d) 3

9. $NOCl \xrightarrow{h\nu} ?$

(a) $NO^{\bullet} + Cl_2$ (b) $NO^{\bullet} + Cl^{\bullet}$

(c) $NO + Cl^{\bullet}$ (d) $NO + Cl_2$

10. $[Cr(NH_3)_6]^{3+} + H_2O \longrightarrow$

(a) $[Cr(NH_3)_5H_2O]^{3+}$ (b) $[Cr(NH_3)_4H_2O]^{3+}$

(c) $[Cr(NH_3)_6H_2O]^{3+}$ (d) $[Cr(NH_3)_3H_2O]^{3+}$

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Classify the types of ligands with suitable example.

Or

(b) What is meant by linkage isomerism? Draw the linkage isomers of $[Co(NH_3)_5NO_2]^{2+}$.

12. (a) State the postulates of crystal filed theory.

Or

(b) Mention the factors affecting the magnitude of crystal field splitting energy.

13. (a) Explain the theories of trans effects.

Or

(b) Write any two substitution reactions in square planner complexes.

14. (a) Discuss the following with chemical equations.

(i) Hydrogenation of alkenes

(ii) Hydroxy formylation.

Or

(b) Explain EAN rule and 18 electron rule.

15. (a) Discuss Ademson's rule.

Or

(b) Explain the function of photovoltaic cells.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) Write a detailed note on valence bond theory (VBT) and its applications.

Or

(b) Draw the geometrical isomers of $[Co(en)_2Cl_2]^-$ and $[Co(NH_3)_2Cl_3]^-$.

17. (a) Explain :

(i) crystal field splitting in tetrahedral complexes.

(ii) stability of complexes.

Or

(b) Write notes on :

(i) Crystal field stabilization energy.

(ii) Limitation of crystal field theory.

18. (a) Explain trans effect and discuss the mechanism of substitution reactions in complexes.

Or

(b) Write notes on :

(i) Labile and inert complexes

(ii) Inner sphere our outer sphere electron transfer reactions.

19. (a) How are the following formed?

(i) Wilkinson's catalyst

(ii) Ziegler – Nattacatalyst.

Or

(b) How are the following organometallic compounds prepared?

(i) $(CH_3)_2Zn$

(ii) $Fe(CO)_5$

(iii) Grignard reagents.

(iv) Alkyl Lithium compounds.

20. (a) Explain symmetry selection rules for electronic transitions.

Or

(b) Explain the following :

(i) Photo substitution reactions

(ii) Photo isomerisation reactions.

———————