(6 pages) Reg. No. : .....

Code No. : 30480 E **Sub. Code : CMCH 61**

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

Sixth Semester

Chemistry — Core

INORGANIC CHEMISTRY – III

(For those who joined in July 2021 and 2022 only)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The correct IUPAC name of $[Pt(NH_3)_2Cl_2]$ is

   (a) Diammine dichloro platinum (11)

   (b) Diammine dichloro platinum (IV)

   (c) Diammine dichloro platinum (0)

   (d) Dichloro diammine platinum (IV)

2. Which of the following options are correct for $(Fe(CN)_6)^{3-}$ complex?

   (a) sp^3d^2 hybridization

   (b) sp^3d hybridization

   (c) d^2sp^3 hybridization

   (d) dsp^3 hybridisation

3. Complex which reacts rapidly is called

   (a) Unstable (b) Labile

   (c) Stable (d) Robust

4. Which of the following is having higher trans effect?

   (a) Cl^- (b) NH_3

   (c) en (d) CN^-

5. The catalyst used in Wilkinson's process is

   (a) $TiCl_4$ (b) $[RhCl(PPh_3)_3]$

   (c) RhCl (d) $TiCl_4 + PPh_3$

6. Identify the compound which is not an organometallic

   (a) C_2H_5ONa (b) $(CH_3)_3Al$

   (c) CH_3MgBr (d) CH_3MgI

7. d^1 electron configuration corresponds to which of the following terms?

(a) ^1D (b) ^2P

(c) ^3P (d) ^2D

8. Which of the following corresponds to the Laporte selection rule?

(a) $\Delta l = 0, +1$ or -1 (b) $\Delta n = 0, +1$ or -1

(c) $\Delta n = +1$ or -1 (d) $\Delta l = +1$ or -1

9. The ligand system present in vitamin B_{12} is

(a) Corrin (b) Porphyrin

(c) Phthalocyanine (d) Crown ether

10. Example for blue copper protein is

(a) hemoglobin (b) cytochrome

(c) ferridoxin (d) plastocyanin

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Explain the structure of the following complexes on the basis VB theory.

(i) $[NiCl_4]^{2-}$

(ii) $[MnBr_4]^{2-}$.

Or

(b) Discuss the geometrical isomerism in octahedral complexes with suitable examples.

12. (a) Explain Labile and inert complexes.

Or

(b) Discuss the preparation and uses of Prussian blue.

13. (a) Explain 18 electron rule with examples.

Or

(b) Discuss the bonding in $Fe_2(CO)_9$.

14. (a) Obtain ground term for M_n^{2+} and Cu^{2+}.

Or

(b) Explain the Mossbauer spectrum of $FeCl_3$ and $K_4[Fe(CN)_6]$.

15. (a) Discuss the structure of Vitamin B_{12}.

Or

(b) Discuss the role of metal ions in biological systems.

PART C — (5 × 8 = 40 marks)

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

16. (a) Give the IUPAC names of the following :

(i) $[Fe(H_2O)_6]Cl_3$

(ii) $K_2[PtCl_6]$

(iii) $[Cu(NH_3)_4]^{2+}$

(iv) $[Co(CN)_6]^{3-}$

(v) $Na_2[Fe(CN)_5NO]$.

Or

(b) Describe the d-orbital splitting in anoctahedral environment of ligand.

17. (a) What is trans effect? Explain the applications of trans effect.

Or

(b) Describe the factors affecting the stability complexes.

18. (a) Describe the structure, preparation and properties of ferrocene and zeise's salt.

Or

(b) Discuss the role of Wilkinson's catalyst in hydrogenation of alkenes.

19. (a) Explain the following :

(i) Hyperfine spilitting

(ii) Zerofield splitting and Kramer's degeneracy.

Or

(b) Describe the Jahn – Teller distortion with a suitable example.

20. (a) Describe the structure and action of mechanism in hemoglobin.

Or

(b) Discuss the applications of platinum complexes in cancer treatment.

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