PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2025
(Fifth Semester)

Branch – **CHEMISTRY**

INORGANIC CHEMISTRY-I

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 An element in the d-block that shows maximum oxidation states is:
(i) Scandium (ii) Vanadium
(iii) Chromium (iv) Manganese

2 The coordination number of the central metal atom in $[Fe(CN)_6]^{3-}$ is
(i) 4 (ii) 8
(iii) 6 (iv) 10

3 Which of the following ions will have the maximum magnetic moment?
(i) $[Mn(H_2O)_6]^{4+}$ (ii) $[Fe(H_2O)_6]^{2+}$
(iii) $[Co(H_2O)_6]^{3+}$ (iv) $[Cu(H_2O)_6]^{2+}$

4 What kind of ligand is the porphyrin ring in hemoglobin?
(i) Bidentate (ii) Monodentate
(iii) Tetradentate (iv) Hexadentate

5 In which compound does the metal-ligand π-backbonding play a significant role?
(i) $[Fe(H_2O)_6]^{2+}$ (ii) $[Ni(CO)_4]$
(iii) $[AgCl]^{2-}$ (iv) $[Cu(NH_3)_4]^{2+}$

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a Explain the trend in ionic radii of the first transition series elements.
OR
b State Chelate and its give any one application.

7 a Explain Sidgwick's Atomic number Rule and its significance in understanding molecular structures.
OR
b Sketch and explain the d-orbital splitting pattern in the Octahedral complexes.

8 a What are the limitations in CFT.
OR
b Describe the trans effect with trans effect series.

Cont...

9 a Analyse the structure of hemoglobin and its function in oxygen transport.

OR

b Narrate the structure and function of Vitamin B_{12}.

10 a How will you preparation and structure of sodium nitroprusside.

OR

b Describe the preparation and structure of nitroso ferrous sulphate.

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a Explain the trend in metallic character and oxidation state of the first transition series elements.

OR

b Discuss the factors that influence the stability of metal complexes.

12 a Outline the Werner's theory of coordination complexes.

OR

b Justify the various applications of the CFSE.

13 a Distinguish between the CFT and VBT.

OR

b Explain the trans effect using pi-bonding theory.

14 a Highlight the role of essential and trace elements in biological system.

OR

b Analyze the sodium-potassium pump in biological system.

15 a Discuss the preparation, properties and bonding in ferrocene.

OR

b Discuss the preparation and bonding nature in $[Cr(CO)_6]$ and $[Fe_3(CO)_{12}]$.

Z-Z-Z END