PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2024
(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. Which of the following complex shows optical isomerism?
(i) $[Co(CN)_6]^{3-}$ (ii) $[Cr(C_2O_4)_3]^{3-}$
(iii) $[ZnCl_4]^{2-}$ (iv) $[Cu(NH_3)_4]^{2+}$

2 The formation of the complex ion $[Co(NH_3)_6]^{3+}$ involves sp^3d^2 hybridization of Co^{3+}. Hence, the complex ion should possess
(i) octahedral geometry (ii) tetrahedral geometry
(iii) square planar geometry (iv) tetragonal geometry

3 Which of the following configuration shows JahnTeller distortion
(i) d^6 (low spin) (ii) d^{10}
(iii) d^5 (high spin) (iv) d^4 (low spin)

4 The biological functions of the myoglobin is
(i) O_2 storage (ii) O_2 transport
(iii) Electron carrier (iv) Oxidation of alkene

5 Which carbonyl has sp^3 hybridization?
(i) $Ni(CO)_4$ (ii) $Cr(CO)_6$
(iii) $Fe(CO)_5$ (iv) $V(CO)_6$

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

6 a) Analyze i) Most of the transition metals are paramagnetic
ii) Compounds of transition metals are generally colored.

OR

b) Sketch all possible geometrical and optical isomer of $[Co(en)_2Cl_2]^+$ and $[Co(en)_3]^{3+}$

7 a) Distinguish between i) High spin and low spin complexes
ii) Inner and outer orbital complexes

OR

b) Calculate CFSE for d^5 and d^6 low spin and high spin complexes.

8. a) Bring out the difference between VBT and CFT.

OR

b) Explain the causes of tetragonal distortion in transition metal complexes.

9. a) Highlight the significance of the structure of chlorophyll in photosynthesis.

OR

b) Sketch and predict function of 4Fe-4S ferredoxin.

10 a) Classify carbonyls with suitable example.

OR

b) Examine the bonding feature of sodium nitroprusside

Cont...

SECTION -C (30 Marks)

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

11. a) Explain various types of structural isomerism with suitable example.

OR

b) Out line various applications of chelate complexes.

12 a) Analyze splitting of d-orbitals in octahedral filed

OR

b) Justify: i) $[NiCl_4]^{2-}$ is paramagnetic while $[NiCN_4]^{2-}$ is diamagnetic (4 Marks)

ii) Mention the electronic distribution of low and high spin Fe^{3+} complexes. (2 Marks)

13. a) Describe the polarization theory of trans effect. Give its limitation.

OR

b) Explain the Jahn-Teller distortion in $[Cu(H_2O)_6]^{2+}$.

14. a) Discuss the mechanism of oxygen transport by haemoglobin.

(OR)

b) Outline the structural features and function of vitamin B_{12}.

15 a) Explain the bonding and structure of the following carbonyls (3+3 Marks)
i) $Ni(CO)_4$ ii) $Cr(CO)_6$

(OR)

b) Describe the preparation and structure of ferrocene.

Z-Z-Z END