

**SHIVAJI COLLEGE, UNIVERSITY OF DELHI**

**DEPARTMENT OF CHEMISTRY**

**INTERNAL TEST-I (Academic Year 2023-24)**

**Name of the Course** : B.Sc. (P) Life Sciences Section-A

**Semester** : V

**Name of the Paper**: Chemistry of d-Block Elements, Quantum Chemistry and Spectroscopy  
(UPC: 42177925)

**Faculty Name**: Dr. Sunil Yadav

**Duration**: 1 Hour

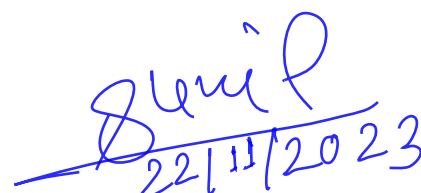
**Maximum Marks**: 10

**Date of Test**: 22.11.2023

Attempt **any five** questions. All Questions carry equal marks.

1.  $K_2Cr_2O_7$  and  $KMnO_4$  are highly colored. Explain.
2. Draw the structures of all the stereoisomers of an octahedral complex  $[M(AA)_2B_2]$  where AA is a symmetrical bidentate ligand and B is a monodentate ligand.
3. The magnetic moment of  $[Fe(CN)_6]^{3-}$  is 1.8 BM. Using VBT explain what information can be derived from this fact about the number of unpaired electrons and hybridization of orbitals used for bonding in this complex. What name is given to this type of complex?
4. Show the splitting of d-orbital in tetrahedral, octahedral and square planar field.
5. Why transition metals and their compounds display catalytic properties?
6. Name the following complexes according to the IUPAC system of nomenclature:
  - (i)  $[(en)_2Co(O_2)(NH_2)Co(en)_2](NO_3)_4$
  - (ii)  $[Co(CO_3)(NH_3)_4]NO_3$
  - (iii)  $K_2[OsCl_5N]$
  - (iv)  $Na[PtBrCl(NH_3)(NO_2)]$

**Faculty Signature:**

  
22/11/2023

**SHIVAJI COLLEGE, UNIVERSITY OF DELHI**

**DEPARTMENT OF CHEMISTRY**

**INTERNAL TEST-II (Academic Year 2023-24)**

**Name of the Course :** B.Sc. (P) Life Sciences Section-A

**Semester :** V

**Name of the Paper:** Chemistry of d-Block Elements, Quantum Chemistry and Spectroscopy  
(UPC: 42177925)

**Faculty Name:** Dr. Sunil Yadav and Dr. Richa Arora

**Duration:** 1 Hour

**Maximum Marks:** 10

**Date of Test:** 30.11.2023

Attempt **any five** questions. All Questions carry equal marks.

1. Draw the CFT diagram for  $[\text{Ni}(\text{CN})_4]^{2-}$  complex.
2. Arrange the following complexes in order of their CFSE:  
 $[\text{CoF}_6]^{3-}$ ,  $[\text{Co}(\text{NH}_3)_6]^{3+}$  and  $[\text{Co}(\text{CN})_6]^{3-}$
3. Why d-block elements shows catalytic property? Explain.
4. Discuss the colour property of potassium permanganate.
5. Identify the complex(s) which show Jahn Teller distortion.  
 $[\text{Cr}(\text{NH}_3)_6]^{3+}$ ,  $[\text{Fe}(\text{CN})_4]^{4-}$  and  $[\text{Cu}(\text{NH}_3)_6]^{2+}$
6. Why the melting points of transition elements are very high? Discuss the reason behind it.

**Faculty Signature:**

*Sunil*  
30/11/2023