

**CS-/2110**

**5231/NH**

Total No. of sheets used: 01

Total No. of Questions: 09

Subject:

Paper: P-I

Title of paper: **Inorganic Chemistry**

Time allowed: 03 Hours

Maximum Marks: 26

Minimum Pass Marks: 09

Note: The candidates are required to attempt two questions each from sections A & B carrying 12 marks each and the entire Section C consisting of 09 short answer type questions carrying 3 marks each.

**Section – A**

- I. a. Discuss the limitations of Valence Bond Theory. (2)  
b. Discuss the factors affecting Crystal Field Stabilization energy. (2)
- II. a. Discuss carefully and concisely the splitting of d-orbitals in the case of tetrahedral complexes. (2)  
b. Explain bonding in  $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$  and  $[\text{Fe}(\text{CN})_6]^{3-}$  in terms of Valence bond theory. (2)
- III. a. Define trans effect and trans directing effect. Give an example to elaborate it. (3)  
b. Name four trans directing ligands. (1)
- IV. What do you mean by Inert and Labile complexes? Show that inertness of a complex is different from its thermodynamic stability. (4)

**Part – B**

- V. Discuss Gouy's method of measuring magnetic stability along with its advantages and disadvantages. (4)
- VI. Write short note on:  
i. Paramagnetism    ii. Diamagnetism  
iii. Ferromagnetism    iv. Antiferromagnetism (4x1=4)
- VII. Discuss Laporte selection Rule and Spin selection Rule of electron absorption spectroscopy. Under what conditions are these rule relaxed? (4)
- VIII. Discuss Utility and limitation of Orgel diagrams. Draw Orgel diagram for  $d^1$  and  $d^9$  system in metal complexes. (4)

**Section – C**

- IX. Write brief answers to the following questions:
- (a) What do you mean by Spectro chemical series? Explain. (2)
- (ii) Define L-S coupling and S-S coupling. (2)
- (iii) Calculate CFSE for  $d^7$  weak field and strong field octahedral complex. (2)
- (iv) Explain on the basis of Valence bond theory that  $[\text{Ni}(\text{CN})_4]^{2-}$  is diamagnetic and square planar. (2)
- (v) Discuss vibronic coupling with examples. (2)