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B. Sc. EXAMINATION

(Fifth Semester)

CHEMISTRY

CH-301

Inorganic Chemistry

me : Three Hours *Maximum Marks : 27*

ote : Attempt *five* questions in all, selecting at least *two* questions from each Section. Q. No. **1** which is compulsory.

(i) What is the reason of the purple color of $[Ti(H_2O)_6]^{3+}$ ion ? 1

(ii) Give the *d*-electron configuration of the following complexes : 1

(a) Square planar $[Ni(CN)_4]^{2-}$

(b) $[Fe(NH_3)_6]^{+2}$

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(iii) What is General Relation between overall stability constant and stepwise stability constants ? 1

(iv) Show stereochemistry of the given substitution reaction : 1

$PtCl_4^{2-}$ with (a) NO_2 (b) NH_3

(v) Calculate the magnetic moment from spin only formula for the following ions : 1

Ni^{2+}, Cr^{3+}

(vi) What is Multiplicity forbidden rule ? 1

(vii) Arrange the following terms in increasing order of energy : 1

$^1S_0$, $^1D_2$, $^3P_2$, $^3P_0$, $^3P_1$

Section A

2. (a) Explain the limitations of valence Bond Theory. 2

(b) Calculate CFSE of the following complexes : 2

(i) $[Fe(CN)_6]^{4-}$

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

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(c) What is the effect of nature of the ligand on the magnitude of Δ value ? 1

3. (a) Briefly discuss the crystal field splitting in case of square planar complexes. 2

(b) What are stepwise stability constants and overall stability constants ? 2

(c) Explain the associative mechanism in the following reaction : 1

$$PtL_2TX + Y \rightarrow PtL_2TY + X$$

4. (a) Define trans-effect and trans-directing ligands with suitable examples. 2

(b) What is Chelate effect ? How does it affect the stability of a complex ? 2

(c) How does the nature of central metal ion affect the stability of the complexes ? 1

Section B

5. (a) Describe relationship between magnetic susceptibility and magnetic moment. 2

degenerate yet these do not contribute towards orbital magnetic moment. 2

(c) Describe the variation of magnetic susceptibility with temperature. 1

6. (a) Why do Tetrahedral complexes of an element ? Give much more intense *d-d* spectra than their octahedral complexes. 2

(b) Draw a combined Orgel diagram for d^1 and d^2 complexes in octahedral and tetrahedral complexes. 2

(c) Give an example of Laparte forbidden transition. 1

7. (a) Write the term symbols for d^2 system. 1

(b) Write a short note on spectrochemical series. 1

(c) What do you understand by spin orbit coupling ? 1

(d) Describe vibronic coupling with examples. 2