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B. Sc. Bio-Tech 5th Sem. (N. S.)
Examination – November, 2017

INORGANIC CHEMISTRY

Paper : BT-507/BIN-506

Time : Three Hours]   *[Maximum Marks : 40*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, Question No. 1 is *compulsory*. Selecting *one* question from each Section.

1. (a) What is the full form of C. F. in C. F. theory.

   $1 \times 8 = 8$

   (b) Name the *two* poles of a given magnet.

   (c) What is the full form of L-S in L-S coupling ?

   (d) Write the spin only formula to determine the magnetic moment.

   (e) Define d-d transition.

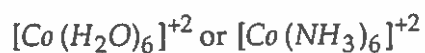   (f) Define Inert complexes.

(g) Define the term Thermodynamic stability of the complexes.

(h) Define spectrochemical series.

SECTION – I

2. (a) Explain crystal field splitting in octahedral complexes. 3

(b) Which of the following has higher CFSE and why ? 3

$$[Co\,(H_2O)_6]^{+2} \text{ or } [Co\,(NH_3)_6]^{+2}$$

(c) Write all the limitations of Valence bond theory. 2

3. (a) Calculate the CFSE for low spin tetrahedral complexes in : 3

(i) d^3

(ii) d^6

(iii) d^8

Configuration.

(b) How the nature of ligands affects the CFSE ? 3

(c) Why tetrahedral complexes are always high spin complexes ? 2

SECTION – II

4. (a) Explain the mechanism of nucleophilic substitution reaction in square planar complexes. 4

(b) Explain the effect of dentacity of ligand on the stability of the complexes. 2

(c) Explain the effect of Nature of central metal atom on the stability of the complexes. 2

5. (a) Explain all the factors affecting the stability of the complexes. 5

(b) Derive a relation in between overall stability constant and step wise stability constant. 3

SECTION – III

6. (a) What is magnetic susceptibility ? How does it vary with temperature ? 4

(b) Calculate the magnetic moment (μ_{L+S}) for : 4

(i) Fe^{3+} ion

(ii) V^{4+} ion in the absence of crystal field.

7. (a) Define : 2

(i) Ferromagnetic substances

(ii) magnetic moment

(b) Explain the Gouy's experiment to determine the magnetic behavior of a substance. 4

(c) Calculate the spin only moment (μ_s) for : 2

(i) Fe^{2+} ion

(ii) Cu^{+1} ion

SECTION – IV

8. (a) Calculate the number of microstates for p^3 configuration. **2**

   (b) State and explain Selection rules for electronic spectra of transition metal complexes. **3**

   (c) Show that p^1 and p^5 configuration have same ground term state. **2**

   (d) Define the term "Term symbol" with an example. **1**

9. (a) Calculate the Term symbols for ground state of $3d^5 4s^1$. **2**

   (b) $[FeF_6]^{3-}$ is colourless while $[CoF_6]^{3-}$ is coloured. Why ? **2**

   (c) Explain the Orgel energy level diagram for d^1 configuration in octahedral complexes. **2**

   (d) Why do tetrahedral complexes gives intense d-d spectra than the corresponding octahedral complexes of transition metal ion. **2**