SARDAR PATEL UNIVERSITY

M.Sc (Semester-II) Examination
Saturday, 16th November 2019
10:00 AM to 01:00 PM
CHEMISTRY:PS02CCHE01
Inorganic Chemistry - II

Note: Figures to the right indicate full marks: **Total marks:70**

Q.1 Select the correct option from the following.   **[08]**

1. Crystal field theory is applied to _____ crystal.
    (a) Covalent   (b) Ionic   (c) Coordinate covalent   (d) None of these

2. According to molecular orbital diagram, the number of anti-bonding electrons in $[CoF_6]^{3-}$ complex is _____.
    (a) Zero   (b) Six   (c) Two   (d) Three

3. _____ is last ion in decreasing order of Nephelauxetic series.
    (a) Oxalate   (b) Chloride   (c) Fluoride   (d) Iodide

4. In d^9 system (High spin) ground state is _____.
    (a) 1_D (b) 2_D (c) 3_D (d) 4_D

5   Diamagnetic susceptibility is independent of _____.
    (a) Applied magnetic field   (b) Radius   (c) Current   (d) None of these

6. When _____, the low spin form becomes ground state.
    (a) $\Delta < P$ (b) $\Delta > P$ (c) $\Delta = P$ (d) $\Delta \leq P$

7. Term symbol of Fermium is _____.
    (a) $^4I_{15/2}$ (b) $^5I_4$ (c) $^7F_1$ (d) $^5I_8$

8. The magnetic property of lanthanides is arising due to _____ electrons.
    (a) 4f   (b) 5f   (c) 5d   (d) 4d

Q.2 Answer the following (Any Seven).   **[14]**

1. Discuss the concept of ligand field theory.
2. Explain the splitting of d-orbitals in Oxo-Vanadium (IV) complex.
3. Explain Orgel diagram for d^4 and d^6 system.
4   Explain: 90^0 super exchange for Cr(III).
5. What is shift reagent?
6. Calculate effective magnetic moment for $K_4[Fe(CN)_6]$ and $K_3[Fe(CN)_6]$.
7. The term symbols for d^3 and d^7 system is ^4F, Explain it.
8. What is diamagnetic susceptibility?
9. Explain magnetic, volume & gram susceptibility.

(1)

(P.T.O)

Q.3

(A) Write a note on Spectrochemical series. [06]

(B) Derive the terms arising out of P^2- system and indicate the order of increasing energy of these terms. [06]

OR

(B) Explain the splitting of d- orbitals in Square planner geometry & Octahedral geometry. [06]

Q.4

(A) Draw and explain the correlation diagram for d^2 configuration. [06]

(B) Illustrate T.S. diagram for d^6 and d^7 systems. & Write down all the possible transitions. [06]

OR

(B) Calculate configuration interaction term(x), crystal field splitting energy, Nephelauxetic ratio, covalent character and Racah parameter for $[Co (H_2O)_6]^{2+}$ complex. [06]
Given $\upsilon_1 = 8100 cm^{-1}$; $\upsilon_2 = 16000 cm^{-1}$; $\upsilon_3 = 20,000 cm^{-1}$ & $B_o = 971 cm^{-1}$

Q.5

(A) Derive the langevin equation. [06]

(B) Derive the Van Vleck equation for magnetic Susceptibility. [06]

OR

(B) **Answer the following:**

1. Calculate Diamagnetic susceptibility correction for Bis (salicylidene) ethylene diamine [03]
Given $\chi_c = -6.0 \times 10^{-6}$ cgs, $\chi_H = -2.93 \times 10^{-6}$ cgs, $\chi_o = -4.6 \times 10^{-6}$ cgs,
$\chi_{N (outside)} = -5.57 \times 10^{-6}$ cgs, $\lambda_C = -0.24 \times 10^{-6}$ cgs & $\lambda_{C=N} = +8.15 \times 10^{-6}$ cgs.

2. Explain the Orbital magnetic moment. [03]

Q.6

(A) Explain some aspects of spin pairing and cross over region. [06]

(B) Find out spin orbit coupling constant and find out λ values for d^1 to d^9 octahedral system for high spin & low spin complex. [06]

OR

(B) **Answer the following:**

1. State and prove the Lande interval rule. [03]
2. Explain the electronic spectra of lanthanide complexes. [03]

—X—
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