Code No. : **628**

FACULTY OF SCIENCE
M.Sc. II Semester Examination, April/May 2013
CHEMISTRY
Paper – I : Inorganic Chemistry

Time : 3 Hours] [Max. Marks : 80

***Note** : Answer **all** questions.*

SECTION – A **(8×4=32 Marks)**

1. a) Explain the terms symmetry element and symmetry operation.

   b) Explain symmetry criteria of optical activity with suitable examples.

2. a) Write a note on L-S coupling.

   b) Derive the ground state terms for d^3, d^5 and d^9 configurations.

3. a) Discuss the structural features of dinuclear metal-metal systems.

   b) Explain Wades rules in polynuclear metal clusters.

4. a) Explain the structural features of myoglobin after oxygenation.

   b) Write the structure of chlorophyll.

SECTION – B **(12×4=48 Marks)**

5. a) Explain descent in symmetry of molecules with substitution.

   b) Assign the point groups by mentioning the symmetry elements present in the following molecules :

      i) HCN

      ii) $[PtCl_4]^{-2}$

      iii) $C_6H_5 - Cl$

      iv) H_2O_2

OR

(This paper contains 2 pages)

P.T.O.

c) Explain the plane of symmetry and classify into different types with suitable examples.

d) Discuss the mathematical requirements for a point group.

6. a) Discuss the effect of weak fields on D and F terms.

b) Explain the Orgel diagrams for d^1, d^9 – Oh geometry and d^4, d^6 – Td geometry.

OR

c) Write a note on inter-electronic repulsion parameters.

d) What are the selection rules for electronic transitions ? Mention the electronic transitions in $[Ni(H_2O)_6]^{+2}$ based on Orgel diagram.

7. a) Discuss the structural patterns in $M_4(CO)_{12}$ and $M_3(CO)_{12}$.

b) Explain the fluxional behaviour in organometallics.

OR

c) Discuss total electron count theory in osmium carbonyl clusters.

d) Explain the factors favouring metal-metal bonding.

8. a) Explain the oxygen isotherms of hemoglobin and myoglobin.

b) What is photosynthesis and explain photosystem I and II.

OR

c) Mention the importance of metal ions in biological systems.

d) Discuss the geometric, electronic and magnetic properties of myoglobin before and after oxygen binding.
