

INORGANIC CHEMISTRY - I

Semester - I

Time Allowed : 3 Hours]

[Maximum Marks : 26

Note : The candidates are required to attempt *two* questions each from Section A and B carrying 4 marks each and the entire Section C consisting of 5 short answer type questions carrying 2 marks each. Attempt *five* questions in all.

Section - A

1. (a) Write Schrödinger wave equation. Name three Quantum Nos. obtained from it. How many orientations are possible for p and d-orbitals? Name them. 2½
(b) What is $(n + l)$ rule? Explain with example. 1½
2. (a) Write electronic configurations of the following : 2
 $\text{Ag}(Z = 47)$, $\text{Ni}^{2+}(Z = 28)$, $\text{Mo}(Z = 42)$ $\text{Cr}^{3+}(Z = 24)$.
(b) Explain :
(i) Hund's rule of maximum multiplicity
(ii) Pauli's Exclusion Principle. 2
3. (a) How XeF_6 is prepared? Discuss its geometry. 2
(b) How does XeF_2 react with : 2
(i) NO
(ii) H_2
(iii) SbF_5
(iv) SO_2
4. (a) Discuss the structure of the following on the basis of VSEPR theory : 2
(i) SnCl_2
(ii) BF_4^-
(b) (i) Explain why all P-F bonds in PF_5 are not equivalent?
(ii) Give limitations of VSEPR theory. 2

Section - B

5. (a) Explain the structure and mode of bonding of diboranes. 2
(b) Compare the bond orders of CN and CN^- on the basis of M.O. theory. 2
6. (a) Differentiate between valence bond theory and molecular orbital theory. 1½
(b) Discuss the relative stabilities, bond dissociation energies and bond length of N_2 , N_2^+ and N_2^- species. 2½
7. (a) Discuss band model for bonding in metals. 2
(b) Predict the co-ordination number of Zn^{2+} in ZnS on the basis of radius ratio rule. Given radii of Zn^{2+} and S^{2-} are 0.74 Å and 1.84 Å respectively. 2
8. (a) Draw the structure of Zinc blende and Wurtzite. What is the basic difference in these two? 2
(b) Metallic bond is weaker than covalent bond. Explain. 2½

Section - C (Compulsory)

9. Explain in short : 2½
(i) What do you understand by the term polarizing power and polarizability? How do these determine ionic character of a compound?

- (ii) Define the following (a) Lattice Energy (ii) Hydration Energy.
- (iii) Draw the shapes of $3d_{x^2-y^2}$ and $3d_{z^2}$ orbitals. How do they differ ?
- (iv) (a) Which noble gas is most difficult to liquify and why ?
(b) Why it is difficult to store XeF_6 in glass vessel ?
- (v) What is the difference between bonding and antibonding molecular orbitals ? $5 \times 2 = 10$