

INORGANIC CHEMISTRY
(Common for B.Sc., B.Sc. Bio Technology
B.Sc. Industrial Microbiology)

Semester-I

[Maximum Marks : 35]

Time Allowed : Three Hours]

Note : Attempt *five* questions (Section C, IX question being compulsory) selecting *two* questions from each of A and B Section. All questions carry equal marks.

Section : A

1. (a) Derive de-Broglie relationship. How does de-Broglie equation explain the Bohr postulates of angular momentum of the electron? 4
(b) What are normalized and Orthogonal wave function? 3
2. (a) Give the derivation of Schrodinger wave equation and define each term involved. 4
(b) Discuss the shapes of 's' and 'p' orbitals. 3
3. (a) Discuss the geometry and shape of XeF₄ and XeOF₄. 4
(b) What led N. Bartlett to prepare the first compound of Xe? 3
4. (a) Discuss the shape and hybridization of the following : 4
BeF₂, PF₅
(b) Discuss the application of Valence bond theory to the formation of hydrogen molecule. 3

Section : B

5. (a) Discuss Molecular Orbital Theory. Draw the molecular orbital energy level diagram for N₂ molecule. 4
(b) Using VSEPR theory, explain the structure of SF₄ and NH₃. 3
6. (a) Explain the structure and bonding in diborane. 4
(b) The dipole moment of HX molecule is 1.92 D and bond distance is 1.20 Å. Calculate the ionic character of HX. 3
7. (a) Draw and explain the structure of calcium fluoride. 4
(b) What is Fajan's rule? Predict which of the two is more covalent - NaCl or MgCl₂. 4
8. (a) Explain why 4
(i) o-nitrophenol has higher boiling point than p-nitrophenol?
(ii) H₂S is a gas while H₂O is a liquid at room temperature?
(b) How does Born Haber cycle help in the determination of lattice energy? 3

Section : E

9. Write brief answer of the following :
 - (a) What is the physical significance of Ψ^2 ?
 - (b) Which noble gas is more difficult to liquefy?
 - (c) State Pauli Exclusion principle.
 - (d) Which point defect lowers the density of an ionic crystal?
 - (e) What are Van der Waal's forces?
 - (f) Compare the stability of bonding and antibonding molecular orbital.

(1×7=7)