

**Bachelor of Science (B.Sc.) Semester—I (C.B.S.) Examination**  
**CHEMISTRY**  
**(Inorganic Chemistry)**  
**Compulsory Paper—1**

Time : Three Hours]

[Maximum Marks : 50]

**N.B. :—** (1) All questions are compulsory and carry equal marks.  
(2) Write equations and draw diagrams wherever necessary.

1. (A) State and explain :  
(i) Heisenberg's uncertainty principle and  
(ii) Hund's rule of maximum multiplicity. 5  
(B) Define ionization potential. What are the factors affecting it ? How does it vary in a group and in a period ? 5

**OR**

(C) What are quantum numbers ? Discuss the significance of principal quantum number. 2½  
(D) Discuss Pauling scale of electronegativity. 2½  
(E) Calculate the effective nuclear charge for a 3d electron in zinc atom ( $Z = 30$ ). 2½  
(F) Write Schrodinger wave equation for hydrogen atom and give the significance of the terms associated with it. 2½

2. (A) Explain Heitler and London treatment for the formation of  $H_2$  molecule with potential energy diagram. 5  
(B) Define solvation and solvation energy of ions. How is lattice energy determined for ionic solid by Born-Haber cycle ? 5

**OR**

(C) Discuss  $sp^3d^2$  hybridization with suitable example. 2½  
(D) Using VSEPR theory explain the structure of  $H_2O$  molecule. 2½  
(E) Discuss the structure of NaCl. 2½  
(F) Discuss the Fajan's rule. 2½

3. (A) What are S-block elements ? Write electronic configuration of S-block elements. 5  
(B) Discuss the structure and bonding in  
(i)  $\text{XeF}_6$  and  
(ii)  $\text{XeOF}_4$ . 5

**OR**

(C) Discuss diagonal relationship between lithium and magnesium. 2½  
(D) Define hydrogen bonding. Explain why  $\text{H}_2\text{O}$  is liquid while  $\text{H}_2\text{S}$  is gas. 2½  
(E) What happens when Xenon tetrafluoride reacts with :  
(i) Hydrochloric acid and  
(ii) Hydrogen gas ? 2½  
(F) Discuss the structure and bonding in Xenon-difluoride. 2½

4. (A) What are p-block elements ? Discuss the following properties of block elements with respect to :  
(i) Atomic and ionic radii and  
(ii) Oxidation state. 5

(B) Explain the structure and bonding in diborane. 5

**OR**

(C) Compare electronegativity of 'p' block elements. 2½  
(D) Discuss diagonal relationship between Boron and Silicon. 2½  
(E) What are peroxyacids ? Discuss the structure of Caro's acid. 2½  
(F) What are hydrides ? Draw the structure of  $\text{NH}_3$  and  $\text{PH}_3$ . 2½

5. Attempt any **ten** of the following :  
(i) Define electron affinity. 1  
(ii) Define screening constant. 1  
(iii) Draw the shape of  $\text{dz}^2$  orbitals. 1

(iv) Write any two limitations of VBT. 1

(v) Give the geometry and type of hybridization of  $\text{PCl}_5$ . 1

(vi) Define polarizing power of anion. 1

(vii) What are types of Hydrogen bonding ? 1

(viii) Draw the structure of  $\text{XeOF}_2$ . 1

(ix) Why S-block elements act as reducing agent ? 1

(x) Draw the structure of  $\text{P}_2\text{O}_3$ . 1

(xi) Draw the structure of  $\text{P}_2\text{O}_5$ . 1

(xii) Which element is more electronegative in p-block elements ? 1