B.Sc. (G) / I

AS

CHEMISTRY— Paper I

(Inorganic Chemistry)

Time : 2 hours

Maximum Marks : 25

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

*Attempt four questions in all.
Question No. 1 is compulsory.*

1. (a) Alkali metals are strong reducing agents. Explain.

   (b) Why does nitrogen form a stable N_2 whereas phosphorus exists as P_4?

   (c) While SO_2 has net dipole moment, CO_2 has zero dipole moment. Discuss.

   (d) What is physical significance of ψ and ψ^2 ?   2,2,2,1

2. (a) Fluorine is more electronegative than chlorine but Cl has higher electron affinity. Explain.

   (b) Why do LiX (X— Cl, Br, I) flout radius ratio rule?

   (c) Why are ionic crystals hard and brittle while metals are hard, malleable and ductile?   2,2,2

3. (a) Using VSEPR theory, predict the shapes of the following:

$$ClF_3, XeF_4$$
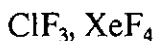
(b) Why are half filled and fully filled orbitals more stable?

(c) Using MO theory compare the stability of NO^+, NO and NO^-. 2,2,2

4. (a) The strength of hydrohalic acids is in the order $HI > HBr > HCl > HF$ which is against electronegativity values of halogens. Explain.

(b) How does the conductance of metals and semiconductors vary with temperature?

(c) Arrange the following in increasing order of acidic character, giving reasons:

HClO, HBrO, HIO. 2,2,2

5. (a) According to Heisenberg's Uncertainty Principle, why is it impossible to measure simultaneously the exact position and momentum of a fast moving electron?

(b) Draw radial probability distribution curves for $4p$ and $4d$ orbitals.

(c) Establish the relationship between polar co-ordinates and cartesian co-ordinates. 2,2,2

6. Write short notes on any *two* of the following:

    (*i*)   Resonance

    (*ii*) Metallic Bonding (Band Theory)

    (*iii*) Lattice Energy.   3,3