(i) Printed Pages: 3 Roll No. .....

(ii) Questions : 9 Sub. Code : 0 0 4 9

Exam. Code : 0 0 0 1

B.A./B.Sc. (General) 1st Semester

1128

CHEMISTRY (Same for B.Sc. Microbial & Food Tech.)

Paper-I : Inorganic Chemistry-A

Time Allowed : Three Hours] **[Maximum Marks : 22**

Note :— Attempt **five** questions in all selecting **one** from each Unit I-IV. Q.No. **1** is compulsory.

1. (a) What is Heisenberg's uncertainty principle ?

   (b) Which has smaller size Cl or Cl^- ? Why ?

   (c) How is XeF_2 prepared ?

   (d) Why are alkali metals soft and have low melting points ?

   (e) What is resonance ?

   (f) Which of the following combinations give π molecular orbitals in LCAO method (considering z-axis to be the molecular axis) :

   (i) $2s + 2s$

   (ii) $2p_x + 2p_x$

   (iii) $2p_x - 2p_x$

   (iv) $2p_y + 2p_y$ 1×6

UNIT—I

2. (a) Write Schrodinger wave equation for Hydrogen atom. Name the three quantum numbers obtained from it and information conveyed by them. 2

   (b) What physical significance is attached to ψ and ψ^2 ? 2

3. (a) On the basis of uncertainty principle, show that an electron cannot reside in the nucleus. 2

   (b) Draw radial probability distribution curves for :

   (i) $n = 3, l = 0$

   (ii) $n = 2, l = 1$ 2

UNIT—II

4. (a) Electron affinity of Be and N are almost zero, while that of Ne is zero. Why ? 1

   (b) What are iso-electronic ions ? Arrange the following iso-electronic ions in the increasing order of their size and account for it : O^{-2}, F^-, Na^+, Mg^{+2}. 3

5. (a) Calculate the electronegativity of chlorine atom using the following data :

   $E_{(H-H)} = 104.2$ kcal mol^{-1} $E_{(Cl-Cl)} = 58.25$ kcal mol^{-1}

   $E_{(H-Cl)} = 103.28$ kcal mol^{-1} Electronegativity of H = 2.1

   2

   (b) Give reasons for the following :

   (i) Second ionization energy of an atom is always greater than the first ionization energy of an atom.

   (ii) Electron affinities of halogens are highest. 1,1

UNIT—III

6. (a) Discuss the structure of XeF_4. How does it react with water ? 2

   (b) Why do most of the noble gas compounds involve xenon, fluorine and oxygen ? 2

7. Explain the following :

   (i) Lithium forms normal oxide, sodium form peroxide and potassium, rubidium and cesium form superoxide.

   (ii) Alkali metals dissolve in liquid ammonia to give blue solution. 2,2

UNIT—IV

8. (a) Draw the Molecular Orbital diagram of BO and calculate its bond order. 2

   (b) Calculate the dipole moment of HCl molecule if its bond length is 1.27Å and % ionic character is 17%. 2

9. (a) Discuss the shape and hybridization of PF_5 and $SnCl_2$. 2

   (b) Discuss the effect of change of electronegativity of central atom on bond angle. 2