

# CHEMISTRY PAPER-I

## (Inorganic Chemistry-A)

Time Allowed : Three Hours

Maximum Marks : 22

Note : (i) Attempt *five* questions in all, selecting *one* question from each Unit.

(ii) Unit V is compulsory.

### Unit-I

- (a) Write a note on Radial Wave Function and Angular Wave Function.  
(b) Write Schrödinger wave equation in terms of spherical polar coordinates.  
(c) Write value of quantum numbers for  $3d_{z^2}$  orbital. 2,1,1
- (a) Draw Radial Probability distribution curve for  $3d$  and  $4d$  orbital.  
(b) Define uncertainty principle. Can we apply it on stationary electron.  
(c) How many Nodal planes are there in  $s$ -orbital? 2,1,1

### Unit-II

- (a) Calculate effective nuclear charge of  $3p$  electrons in the atom of phosphorous.  
(b) Which have more electron affinity : F or Cl and why?  
(c) Which has smaller size (i) Ce or  $Ce^{-}$  (ii) F or Ne? 2,1,1
- (a) C is more electro-negative in  $-C_2H_2$  or  $C_2H_4$  and why?  
(b) How many elements are there in  $p$ -block.  
(c) What is difference between electron affinity and electro-negativity? Calculate electro-negativity of Chlorine if:  
 $E_{H-H} = 104.2 \text{ k.cal/mole}$   
 $E_{H-Cl} = 103.28 \text{ k.cal/mole}$  and  
 $E_{Cl-Cl} = 58.25 \text{ k.cal/mole}$  1,1,2

### Unit-III

- (a) Discuss bonding and shape of  $XeF_4$  molecule.  
(b) Complete the reactions :  
 $XeF_6 + 3H_2O \rightarrow ?$   
 $XeF_4 + SbF_5 \rightarrow ?$   
 $Xe_{(g)} + PtF_6(g) \rightarrow ?$   
 $XeOF_4 + 3H_2 \rightarrow ?$  2,2
- (a) Why sodium metal form peroxide ( $Na_2O_2$ ) in preference to oxide ( $Na_2O$ ).  
(b) Why lithium is strongest reducing agent among alkali metals? Explain.  
(c) Write brief note on Crown ethers. 1,2,1

#### Unit-IV

7. (a) Draw molecular orbital diagram for CO molecule.  
(b) Write Hannay and Smith formula to calculate percentage of Ionic character in compounds.  
(c) Arrange in order of increasing bond angles :  
 $H_2S, H_2O, H_2Se$  2,1,1
8. (a) Discuss bonding and shape of molecule on basis of VSEPR theory:  
 $ClF_3$ .  
(b) Draw molecular orbitals coming out of combination of S-S orbital:  
and  $P_x - P_x$  orbital.  
(c) Does electronegativity of central atom in the molecule has any effect  
on shape or molecule. Explain with *one* example. 2,1,1

#### Unit-V

#### Compulsory Question

1 each

9. (a) Is  $O_2$  paramagnetic or not and why ?  
(b) Write electronic configuration of elements having atomic number 24.  
(c) Which have higher ionization energy -N or O ?  
(d) What is the cause of diagonal relationship ?  
(e) Give main biological functions of  $Na^+$  and  $K^+$  ions.  
(f) What is hybridization I in  $IF_7$  ? 1×6=6