30x1=30

INORGANIC CHEMISTRY

(Common with B.Sc. & B.Sc. Biotechnology)
Semester-I
Paper-I

Time Allowed : 3 Hours] [Maximum Marks : 26

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Note : The candidates are required to attempt *two* questions each from Section A and B carrying 4 marks each and the entire Section C consisting of 5 short answer type questions carrying 2 marks each. Attempt *five* questions in all.

Section - A

1. (a) What do you understand by Normalized and Orthogonal wave functions ? 1½
   (b) Draw radial probability distribution curves for :
   $n = 3$ $l = 0$; $n = 3$ $l = 1$ and $n = 3$ $l = 2$ for H-atom. 2½
2. (a) What are Quantum Numbers ? Discuss azimuthal and magnetic quantum number. 2
   (b) Which of the following ions are diamagnetic or paramagnetic:
   Al^{3+} ($z = 13$), Ni^{2+} ($z = 28$), Ti^{4+} ($z = 22$) Co^{3+} ($z = 7$) 2
3. (a) How do XeO_3 and $XeOF_2$ differ in their structures ? 2
   (b) Complete the following reactions :
   (i) $XeF_6 + SiO_2 \rightarrow$ (ii) $XeF_4 + SbF_5 \rightarrow$
   (iii) $XeF_4 + H_2O \rightarrow$ (iv) $XeO_2F_2 + H_2O \rightarrow$ 2
4. (a) What is Hybridisation ? Discuss the shape of BF_4^- and $SnCl_6^{2-}$ on the basic of hyberidisation. 2½
   (b) All the I – F bonds in IF_7 are not equivalent. Give reasons. 1½

Section - B

5. (a) Compare the bond order of CO and CO^+ on the basic of Molecular Orbital Theory.
   (b) Calculate % ionic character of Si–H bond in SiH_4. Pauling electronegativities of Si and H are 1.8 and 2.1 respectively. 2
6. (a) What is Radius Ratio Rule ? Calculate the radius ratio for an ionic crystal in which cations are surrounded by six anions respectively. 2
   (b) Why is metallic bond weaker than covalent bond ? Explain. 2
7. (a) State Fajan's rule. Explain with the help of this rule, which compound of each of the following is more covalent ? 2
   (i) AgCl or AgI (ii) LiCl or KCl
   (b) Draw neat and labelled diagram of the unit cell of fluorite structure. Give its main features. 2
8. (a) What do you understand by Electron Deficient compounds ? Discuss the structure and mode of bonding of diporanes. 2
   (b) On the basic of VSEPR theory, discuss the structure of :
   (i) H_3O^+ (ii) ClF_3. 2

Section - C (Compulsory)

9. (i) Write notes on :
   (a) Heisenberg's uncertainty principle (b) Aufbau principle.
   (ii) What are eigen functions and eigen values ?
   (iii) What are non-stoichiometric compounds ? Discuss defects in non-stoichiometric compounds.
   (iv) What is the difference between bonding and antibonding molecular orbital ?
   (v) The solubilities of nobel gases in water increases as atomic number increases in the group. Explain. 5×2=10

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