INORGANIC CHEMISTRY

(Common for B.Sc. Bio-Tech.)

Semester-VI

Time Allowed : 3 Hours] [Maximum Marks : 26

Note : The candidates are required to attempt five questions in all selecting two questions each from Section A and B while Q. No. 9 of Section C is compulsory.

Section - A

1. (a) Define HSAB principle. Discuss the applications of hard-soft acid-base principel. 2
   (b) $[AgI_2]^-$ is stable but $[AgF_2]^-$ is unstable. Why ? 1
   (c) Classify the following into hard, soft and borderline acids and bases ? 1

   $I^-, CO, Ni^{2+}, CO_2, Ag^+, NH_4^+, SO_3^{2-}, BH_3, H_2O, NO'_3$

2. (a) How electro-negativity can be used to explain hardness and softness of acids and bases ? 2
   (b) Draw stepwise structural arrangement observed in associative mechanism in square-planar substitution. 2

3. (a) Compare roles of Ca^{2+} and Zn^{2+} at the active sites of enzymes. In what ways is Ca^{2+} advantageous over alkali metal ions ? 2
   (b) Explain Cooperativity in haemoglobin. Discuss its mechanism. 2

4. (a) What is meant by Nitrogen fixation ? What are the main fundamental requirements of biological N_2 fixation ? 2½
   (b) What is Bohr effect ? Explain with the help of graph. 1½

Section - B

5. (a) What are Silicones ? How are cross-linked silicones prepared ? Give *two* important applications of silicones. 2
   (b) Disucss the general features of $d\pi - p\pi$ model for bonding in $(NPCl_2)_3$. 2

6. (a) What are homomorphic and hetermorphic π-systems ? Explain. 2
   (b) Write a brief account of (i) Silicon oils, (ii) Silicone rubber, and (iii) Silicone resins. 2

7. (a) What happen when one of the Ph_3P ligand in Wilkinson catalyst is replaced by Me_3P in the hydrogenation of olefins ? 2
   (b) Classify bonding in organometallic compounds. Give example of each type. 2

8. (a) Describe bonding in metal carbonyls. How does IR spectroscopy help in explaning bonding in metal carbonyls ? 2
   (b) Write IUPAC names of the following ? 2
   (i) $Zn(C_2H_5)_2$
   (ii) $CH_3 - SnH_2Cl$
   (iii) $Fe\left(\eta^5 - C_5H_5\right)_2$
   (iv) $Mn\left[\left(\eta^3 - C_6H_5\right)(CO)_4\right]$

Section - C

(Compulsory Question)

9. (a) What is Symbiosis ? Discuss theoretical basis of hardness and softness.
   (b) What is Porphyrin ? Draw the structure of Heme.
   (c) Write a brief account of $Na^+ - K^+$ pump.
   (d) Why do polyphosphazenes chain prefer a *cis-trans* conformation to a *trans-trans* conformation ?

(e) N_2 is isoelectronic with Co, yet it is a poor σ-donor compared to Co. Explain.(5×2=10)