(i) Printed Pages : 4 Roll No. .....

(ii) Questions : 9 Sub. Code : 0151

Exam. Code : 0002

B.A./B.Sc. (General) 2nd Semester

1048

CHEMISTRY

Paper–V : Inorganic Chemistry-B

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

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

Note :– Attempt **five** questions in all, including question No. 9 (Unit-V) which is compulsory and selecting **one** question each from Units I-IV.

UNIT–I

1. (a) Draw neat diagram for NaCl and CsCl structure. What is the basic difference between the two structures ?

   (b) What are steoichiometric compounds ? Discuss the Frenkel defects. 2,2

2. (a) What are semiconductors ? Discuss mechanism of intrinsic and extrinsic semiconductors.

   (b) (i) What are the limitations of radius ratio rule ?

(ii) A solid is made up of two elements X and Y. Atoms Y are in CCP arrangement while atoms X occupy all the tetrahedral sites. What is the formula of the compound ? 2,2

UNIT–II

3. (a) What is hydrogen bond ? Discuss two types of hydrogen bonds. Give two examples of each type.

(b) Calculate the lattice energy of KCl crystal from the following data

Sublimation energy of K(S) = 102.5 kJ/mol

Dissociation energy of Cl_2(D) = 230.5 kJ/mol

Ionization energy of K(g) (I) = 450.6 kJ/mol

Electron affinity of Cl(g) (E) = –350.2 kJ/mol

Heat of formation of KCl ($4H_f$) = –420.4 kJ/mol. 2,2

4. (a) Why solubilities of halides of silver in water are low while that of alkali metal halides are very high ?

(b) Explain different types of van der Waals forces. 2,2

UNIT–III

5. (a) (i) Boron forms no compounds in unipositive state but lithium in unipositive state is quite stable.

(ii) What happens when boric acid is heated to redness ? Write the reaction.

(b) Discuss the structure of borazine. Why is it called inorganic benzene. 2,2

6. (a) Explain the following :

(i) $[AlF_6]^{3-}$ exists whereas $[BF_6]^{3-}$ does not.

(ii) How do the carbides CaC_2 and Al_4C_3 differ ?

(b) (i) Define diagonal relationship. Give resemblance between boron and silicon.

(ii) What are fluorocarbons ? Name one fluorocarbon which is used as a refrigerant. 2,2

UNIT–IV

7. (a) Discuss the structure of OF2. Why is the bond angle of OF_2 molecule smaller than that of Cl_2O ?

(b) (i) Write two reactions of H_2SO_4 acts as an oxidising agent.

(ii) Why SF_6 has zero dipole moment while SF_4 has non-zero dipole moment ? 2,2

8. (a) (i) Write formulae of oxoacids of chlorine. Explain the trend of their acid strength giving reason.

(ii) Complete the reaction

$S_4N_4 + Cl_2 \rightarrow$ ..... and $S_4N_4 + SnCl_2 \rightarrow$ .....

(b) (i) What are interhalogen compounds ? Give suitable example.

(ii) I_3^- is known whereas F_3^- is not known. Why ? 2,2

UNIT–V

9. (a) The radii of Mg^{++} and O^{--} are 0.66A° and 1.40A°. Predict the probable type of the site occupied by Mg^{++} ions.

(b) Cu^{+} and Na^{+} are of the same size but CuCl is insoluble while NaCl is soluble in water. Explain.

(c) How many pentagonal and hexagonal faces are present in C_{70} and C_{76} fullerenes ?

(d) Which out of CCl_4 and $SiCl_4$ can be easily hydrolysed and why ?

(e) Why bleaching action of SO_2 is temporary process ?

(f) Why concentrated nitric acid becomes yellow on exposure to sunlight ? $6 \times 1 = 6$