Sr. No. of Question Paper : 8591   **C**   **Roll No**.............

Unique Paper Code   : 217573

Name of the Paper   : GEHT-504 : Inorganic Chemistry – I

Name of the Course   : B.Sc. (H) Geology, Part III

Semester   : V

Duration   : 3 Hours

Maximum Marks   : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **five** questions.
3. Each question carry **15** marks.

1. (a) Derive the following forms of Gibbs – Duhem Equation.

$$Sdt - Vdp + \sum n_i d\mu_i = 0 \text{ (where i=1 to n.)}$$

   (b) Define partial molar quantity.

   (c) Show that the variation of chemical potential of a component 'i' with pressure is given by

$$d\mu_i = V_{i,m} dp$$

2. (a) Derive an expression for the free energy of mixing when n_1 moles of nitrogen and n_2 moles of H_2 are mixed isothermally and isobarically.

   (b) Show that the molar free energy of mixing ΔG_{mix} in a binary ideal gas mixture is minimum when two gases are present in the equimolar ratio.

   (c) Calculate free energy of mixing ΔG_{mix} at 25°C and 1 atm when 10 moles of He are mixed with 10 moles of Ne.

3. (a) Write the role of Na^+ and K^+ ions in the living system.

   (b) Explain the role of Metal Chelates in living system.

(c) Write the structure of Chlorophyll.

4. (a) Give two methods of preparation of diborane and discuss its structure.

   (b) Explain the thermal stability of the hydrides of group I and group II elements.

   (c) What happens when NaH reacts with

   (i) CO

   (ii) $SiCl_4$.

   (iii) Fe_3O_4.

5. (a) Define the following :

   (i) Collision number.

   (ii) Collision diameter.

   (iii) Mean free path of molecules.

   (iv) Collision frequency.

   (v) Degrees of freedom of motion.

   (b) What is the effect of temperature and pressure on the coefficient of viscosity.

   (c) Define the principle of equipartition of energy.

6. (a) What is the effect of temperature and pressure on collision frequency.

   (b) Define viscosity. Give its S.I. unit.

   (c) What is the effect of temperature on viscosity of a liquid and gases.?

   (d) Define Surface Tension. Give its S.I. unit.

   (e) What is the effect of temperature and pressure on surface tension of a liquid ?

   (f) Why drop number method is more accurate than drop weight method for the determination of surface tension of a liquid by Stalagmometer ?