Note:-
  1. All Questions are compulsory.
  2. Numbers on the right indicate full marks.

Section A

Q.1 Select and write the correct answer. (4)

1. When NaCl is added to water
   A) Freezing point is raised
   B) Boiling point is depressed
   C) Freezing point does not change
   D) Boiling point is raised

2. Which of the following will have maximum depression in freezing point?
   A) 0.5M Li_2SO_4
   B) 1M KCl
   C) 0.5M $Al_2(SO_4)_3$
   D) 0.5M $BaCl_2$

3. 15 g of non-volatile solute is dissolved in 250 g of solvent, shows elevation in boiling point 0.01 K. If gram molecular weight of solute is 60, the molal elevation constant for solvent is
   A) 0.1 Km^{-1}
   B) 1 Km^{-1}
   C) 10 Km^{-1}
   D) 0.01 Km^{-1}

4. The osmotic pressure of blood is 7.65 atm at 310 K. An aqueous solution of glucose isotonic with blood has the percentage (by volume)
   A) 5.41 %
   B) 3.54 %
   C) 4.53 %
   D) 53.4 %

Q.2 Answer the following. (3)

1. Define Solubility.

2. Define Semipermeable membrane.

3. Define Partial pressure.

Section B
Attempt any Four

Q.3 State the relation between total vapour pressure and partial pressure in vapour phase. **(2)**

Q.4 Write the expression for the different colligative properties for non-electrolytes which are modified to make applicable for electrolyte solutions. **(2)**

Q.5 Le-Chatelier principle, exothermic and endothermic processes. **(2)**

Q.6 Why naphthalene dissolves in benzene but not in water? **(2)**

Q.7 State and explain the expression for depression in freezing point. **(2)**

Q.8 The solubility of N_2 gas in water at 25 ^oC and 1 bar is 6.85×10^{-4} mol L^{-1}. Calculate **(2)**

(a) Henry's law constant

(b) molarity of N_2 gas dissolved in water under atmospheric conditions when partial pressure of N_2 in atmosphere is 0.75 bar.

Section C
Attempt any Two

Q.9 What is lowering of vapour pressure of a solution? **(3)**

Q.10 Explain reverse osmosis. **(3)**

Q.11 3.795 g of sulphur is dissolved in 100 g of carbon disulfide. This solution boils at 319.81 K. What **(3)** is the molecular formula of sulphur in solution? The boiling point of the solvent is 319.45 K.

(Given that K_b for CS_2 = 2.42 K kg mol^{-1} and atomic mass of S = 32 u)

Section D
Attempt any One

Q.12 Explain relation between depression of freezing point and lowering of vapour pressure **(4)** graphically.

Q.13 Which of following solutions will have maximum boiling point elevation and which have **(4)** minimum freezing point depression assuming the complete dissociation?

(a) 0.1 m KCl   (b) 0.05 m NaCl   (c) 1 m $AlPO_4$ (d) 0.1 m $MgSO_4$