

Roll No.

Total Pages : 4

GSM/D-20

924

PHYSICAL CHEMISTRY

Paper - CH-202

Time allowed : 3 Hours

Maximum Marks : 32

Note : Attempt **five** questions in all, selecting two questions from each unit. Question No. 1 is compulsory.

Compulsory Questions

1. (a) Which are intensive properties among following : 2
 - (i) Internal energy
 - (ii) Entropy
 - (iii) Volume
 - (iv) Dipole moment.
- (b) The value of C_p and C_u for a gas are 6.96 and 4.97 find the value of R and Y. 2
- (c) Define law of chemical equilibrium. 2
- (d) If $\frac{C_1}{(1 - \alpha) C_2}$ have constant value, Where concentration of solute is C_1 and C_2 in solvent 1 and 2 respectively, and α is degree of dissociation of solute. What does it signifies. 2

UNIT-I

2. (a) Explain various types of Thermodynamic systems with examples. 3
- (b) Which are state functions among following also give reason : 3
- (i) Internal energy
- (ii) Work
3. (a) Prone enthalpy change is a path function. 3
- (b) What symbols, signs are used for work done on the system and work done by the system. 3
4. (a) Explain Joule-Thomson effect for real gases. 3
- (b) Derive the relationship of Joule-Thomson coefficient for real gases in terms of Vander Waal's constants. 3
5. (a) Derive the equations for calculating change in internal energy and work done for adiabatic process of ideal gases. 3
- (b) Derive $Pv^{\gamma} = \text{constant}$ for reversible adiabatic expansion of ideal gas. 3

UNIT-II

6. (a) Derive the equation of equilibrium constant in terms of pressure. 3
- (b) Drive the relationship between standard free energy change with equilibrium constant. 3
7. (a) Write the applications of Clavsiivs-Clapeyron equation. 3
- (b) The normal boiling point of water is 100 °C. Its vapour pressure at 80°C is 0.47 atmosphere. Calculate the enthalpy of vaporization. 3
8. The partition coefficient of Iodine between CS₂ and water is 410. A solution of KI containing 8.0gm of salt per litre was shaken with CS₂ until equilibrium, the aqueous layer contain 2.15gm of Iodine per litre and the CS₂ layer 35.42 gm of Iodine per litre. Calculate the equilibrium constant for the reaction :
- $$\text{KI} + \text{I}_2 \rightleftharpoons \text{KI}_3$$
- Given that the concentration of Iodine in the aqueous layer is the sum of free and combined iodine. 6

9. (a) Calculate how much compound can be extracted from 100 ml of aqueous solution containing 5.0 gm of compound extracted with 50 ml of ether. The partition coefficient of compound between ether and water is 4. 3
- (b) How to calculate the degree of association of solute in one of the solvents by logarithmic method. 3