

B. PHARMACY SECOND YEAR FIRST SEMESTER - 2019**Subject : PHARMACEUTICAL CHEMISTRY - IV
(PHYSICAL)**

Time: 3 hours

Full Marks 100

Answer any FIVE questions taking at least ONE from each group. ALL parts of a question must be answered in the same place of the answer-script.

Group A

1. (a) Show that for adiabatic expansion of ideal gas $PV^\gamma = \text{Constant}$ [6]
(b) Mention the postulates of the Kinetic theory of gases. [6]
(c) Show that $C_p - C_v = R$. Define poisson ratio. [4 + 2]
(d) Define parachor. Discuss its application. [2+2]
2. (a) Write a note on the Carnot Cycle. [12]
(b) Define entropy and discuss its significance [8]
3. (a) Write a note on buffer capacity. What is maximum buffer capacity? [6+4]
(b) Discuss different factors influencing pH of a buffer solution. [5]
(c) What is the relationship between K_a of a weak acid and K_b of its conjugate base? [5]
4. Write notes on: [4 x 5]
(i) Clausius-Clapeyron equation
(ii) van't Hoff equation
(iii) Parachor
(iv) Surface tension

Answer any FIVE questions taking at least ONE from each group. ALL parts of a question must be answered in the same place of the answer-script.

Group B

5. Explain the following? Any four 20
- BET isotherm
 - Difference between physisorption and chemisorptions
 - Application of adsorption
 - Forces acting in the interaction of colloids
 - Preparation of colloids (different methods)
6. Explain the following with examples? 20
- Half-life of 1st order reaction
 - BCS classification of drug substance based on aqueous solubility and their intestinal permeability
 - Types of solvents, mechanisms with examples
 - Solubility of liquids in liquids
7. Solve the following? 20
- What is the solubility of benzylpenicillin G at a pH sufficiently low to allow only the nondissociated form of the drug to be present?
Given: - pKa of benzylpenicillin G = 2.76, solubility of the drug at pH 8.0 = 0.174 mol/dm³
 - Calculate the mole fraction of HCl in a solution of hydrochloric acid in water, containing 36 per cent HCl by weight
 - Raoult's Law and deviation from Raoult's Law
 - Grams of a non-electrolyte compound dissolved in 75 ml of water. The density of the solution is 0.779 g/mol which consists of 42.9% C; 2.4% H; 16.6% N; 38.1% O. If we know the boiling point increase was at 6.5°C and $K_b = 20.2^\circ\text{C/m}$, determine the molecular formula of the compound?