CHS 1511 / CHE 1521   **PHYSICAL CHEMISTRY-I**   **Time: 3 Hours**
Max Marks: 75

__Answer any FIVE questions__   **5X15 = 75**

1. a) Derive kinetic gas equation. (6)

    b) Calculate the three degrees of freedom for water and carbon dioxide. (4)

    c) For hydrogen gas at 0 °C, calculate the most probable velocity (c_p), the average velocity ($<c>$) and root mean square velocity ($<c^2>)^{1/2}$. (5)

2. a) Describe the P-V isotherm of CO_2. (6)
    b) Derive van der Waals equation of state for real gases. (7)
    c) Define Boyle temperature. (2)

3. a) What are liquid crystals? Give any one example. (2)
    b) Classify and explain thermotropic liquid crystals. (4)
    c) Derive Clausius-Mosotti equation. (6)
    d) Write a note on Gouy's method. (3)

4. a) Elaborately discuss about the following properties of colloids i) Coagulation ii) Electrophoresis iii) Electro-osmosis and iv) Brownian movement (3+3+3+2)
    b) Discuss about the applications of colloids. (4)

5. a) Highlight the importance of ion-exchange adsorption. (5)
    b) Differentiate between physisorption and chemisorptions. (5)
    c) Derive Freundlich adsorption isotherm. (5)

6. a) List out any two factors affecting adsorption isotherms. (2)
    b) What is gold number? (2)
    c) Derive debye equation. (6)
    d) Discuss about the BET theory of adsorption isotherms. (5)

7. a) How do real gases deviate from ideal gases? (4)
    b) Explain the principle of equipartition of energy. (5)
    c) Define the following terms: i) Mean free path ii) Collision frequency iii) Collision number (6)