## PHAR 113 Physical Chemistry [45 Hours]

**Unit – 1: Gaseous State (4 hrs)**

Introduction, gas laws, kinetic theory of gaseous, derivation of kinetic gas equation, deduction of gas laws, deviation from ideal behaviors, Vander Waal equation of state for real gases, significances of Vander Waal constant a and b, critical phenomena and vander Waal constant value of a and b.

**Unit – 2: Liquid State (6 hrs)**

Introduction, vapor pressure and boiling point, surface tension, determination of surface tension by drop formation method, viscosity and its determination by ostwald's viscometer, effect of temperature on viscosity, additive and constitutive properties, parachor and reochor, refractive index, optical rotation, dipole moments.

**Unit – 3: Solutions (10 hrs)**

Mole concept, concentration terms, ideal and real solutions, Henry's law, colligative properties, ideal solution(non volatile solute), lowering of vapor pressure, Raoult's law, determination of molecular weight from vapor pressure lowering, ideal solution and deviation from Raoult's law, ideal solution of two volatile components, elevation of boiling point, determination of molecular weight from freezing point depression, osmotic pressure, distribution coefficient, application and limitations of distribution law, phase rule, statements, terms involved in phase rule, derivation of phase rule, single component system( water system). Conductance (specific conductance, equivalent conductance, molar conductance, cell constant), measurement of conductance, variation of conductance with dilution, Faraday's law of electrolysis, Debye -Huckel Theory.

**Unit – 4: Adsorption (3 hrs)**

Adsorption and absorption, Freundlich adsorption isotherm, Langmuir adsorption isotherms, application of adsorption.

**Unit – 5: Thermodynamics (8 hrs)**

Introduction, importance, limitation, terms/ terminology, state function , extensive and intensive properties, thermodynamic process and system, internal energy, work done(reversible and irreversible). First law of thermodynamics, enthalpy, enthalpy change, temperature dependence of enthalpy change, Hess's law of constant heat summation, application and calculations; heat of vaporization, heat of fusion, heat of formation, heat of combustion, heat of neutralization, heat capacities and relation between Cp and Cv; criteria of spontaneous process, entropy, second law of thermodynamics, free energy, relation between free energy and equilibrium constant, relation between free energy and useful work. Third law of thermodynamics.

**Unit – 6: Photochemistry (3 hrs)**

Consequences of light absorption, Lambert-Beer's law, Laws of photochemistry, Quantum efficiency.

**Unit – 7: Chemical Kinetics (8 hrs)**

Introduction, rate of reaction, factor influences the rate of reaction, rate law equation, rate constant, order and molecularity of reaction, integrated rate equation for zero order, first order and second order (single and different types of reaction) and half life period, activation energy, temperature dependence of Arrhenius equation, opposing reaction (first order opposed by first order), parallel reaction, collision theory of bimolecular reaction (no derivation), unimolecular reaction, steady state approximation, catalysis, characteristics of catalysis, homogeneous catalysis, heterogeneous catalysis, acid base catalysis, enzyme catalysis, Michaelis Menten equation.

**Unit – 8: Quantum Mechanics (3 hrs)**

Postulates of Quantum Mechanics, Operator (Linear, Laplacian, Hamiltonian operator), and Schrodinger's wave equation.