CHEMISTRY
(Major)
(6th Semester)
Course No.:**CHM-DSC-353**
(Physical Chemistry –III)
Chemical Kinetics and Electrochemistry
Contact Hours: 60; Credits: 04
Full Marks = 100[End Semester Exam (70) Internal Assessment (30)]
Pass Marks = 40 [End Semester Exam (28) Internal Assessment (12)]

Unit -1: Chemical Kinetics-I

Rate of reaction, Order and molecularity of a reaction, rate laws and rate constant in terms of the advancement of a reaction, differential and integrated form of rate expressions and half-life up to second order reactions, experimental methods of the determination of order of a reaction. Effect of temperature on reaction rate, effect of catalyst, Arrhenious equation.

Unit-2: Chemical Kinetics-II

Theories of reaction rate: Collision theory of bimolecular reaction; Activated complex theory, Lindemann theory (qualitative treatment). Equilibrium approximation and steady state approximation; kinetics of complex reactions (integrated rate expressions up to first order only): (i) Opposing reactions (ii) parallel reactions and (iii) consecutive reactions and their differential rate equations, (iv) Chain reaction.

Unit-3: Conductance

Arrhenius theory of electrolytic dissociation. Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Molar conductivity at infinite dilution. Kohlrausch law of independent migration of ions. Debye-Hückel-Onsager equation. Transport number and their determination using Hittorf and Moving Boundary methods, Conductometric titration, Ostwald's dilution Law, hydrolysis constants of salts.

Unit-4: Electrochemistry-I

Faradays laws of electrolysis, EMF of cell, Standard EMF, rules of oxidation/reduction of ions based on half-cell potentials. Galvanic cell, reversible and irreversible cell, Single electrode potential, thermodynamic of reversible electrode and cell, Nernst equation, standard electrode potential, electrochemical series, determination of activity and activity coefficient.

Unit-5: Electrochemistry-II

Application of EMF measurements in determining (i) free energy, enthalpy and entropy of a cell reaction, (ii) equilibrium constants, and (iii) pH values using hydrogen/glass electrodes, (iv) solubility product of sparingly soluble salt.

Concentration cells with and without transference, liquid junction potential; discussion of potentiometric titrations (acid-base, redox, precipitation).

Reference Books:

- Puri, Sharma, Phathania; Principle of Physical Chemistry, 45th Edition, Vishal Publications.
- Ball, D. W. Physical Chemistry Cengage India (2012).
- Mortimer, R. G. Physical Chemistry 3rd Ed., Elsevier: NOIDA, UP (2009).
- Levine, I. N. Physical Chemistry 6th Ed., Tata McGraw-Hill (2011).
- Metz, C. R. Physical Chemistry 2nd Ed., Tata McGraw-Hill (2009).
- Laidler, K. J., Chemical Kinetics 3rd Ed., Pearson Education India (2008).
- Kapoor, K. L., A Textbook of Physical Chemistry – Vol. 1 – 6, 2nd Ed., Laxmi Publications-New Delhi (2011).