

UNIT - I

Chemical Thermodynamics: Second law of thermodynamics, entropy and its physical significance, entropy change of ideal gases, free energy (Gibbs and Helmholtz), thermodynamic properties for reversible and irreversible processes, equilibrium constant from thermodynamic considerations, Maxwell's relationships, Gibbs-Helmholtz equation, Clapeyron-Clausius equation, concept of chemical potential with examples, Van't Hoff reaction isotherm, third law of thermodynamics and its applications.

Fundamentals of Instrumental analysis: UV-VIS, IR, NMR, Mass and Fluorescence spectrophotometry.

UNIT - II

Electrochemistry: Behavior of strong electrolytes with concentration, electrochemical cells, EMF and applications of EMF measurements, commercially important cells and corrosion (its chemistry and remedial methods).

Chemical Kinetics: General discussion on the reactions of different orders including their rate laws with examples, problems based on first and second order reactions, pseudo-unimolecular reactions, theories of reaction rates (collision and transition state theories), activation energy and catalytic reactions. Lasers in chemistry and its applications.

UNIT - III

Coordination Chemistry: Structure of coordination compounds corresponding to coordination no. up to 6, types of ligands, EAN, isomerisms, bonding in coordination compounds (VBT and MOT), Application of organometallic chemistry and coordination compounds in biology (Vitamin B12 and Hemoglobin).

Chemistry of materials: Preparation, properties and applications.

UNIT - IV

Organic Chemistry: Stereochemistry of carbon compounds, *E-Z* and *R-S* systems of nomenclature of organic molecules, conformation analysis for certain organic systems, pericyclic reactions, organic photochemistry, structures and functions of biologically important molecules (carbohydrates, amino acids, proteins and nucleic acids).

Polymers: Classification and structures of polymers, commercially important polymers: natural and synthetic rubber, biodegradable polymers and composite polymeric materials.

Text Books:

1. Engineering Chemistry by B. Sivasankar, Tata McGraw Hill
2. Engineering Chemistry by A. Mallick, Viva Books, 2008.
3. Organic Chemistry by J. Clayden, Nick Greeves, S. Warren, Oxford Press 2012.
4. Levine, *Physical Chemistry*, 5/e (7th reprint), Tata McGraw Hill, 2006.
5. Inorganic Chemistry, Principle, structure and reactivity, J.E. Huheey, E.A. Keitler, R.L. Keita, O.K. Medhi, Pearson Education, 4th Ed.
6. Chemistry, J.E. McMurry and R.C. Fay, 5th Ed., Pearson Education, 2008

Reference Books:

1. Shriver, Atkins and Langford, *Inorganic Chemistry*, 2/e, ELBS, 1994.
2. S.H. Pine, *Organic Chemistry*, 5/e (special Indian ed.), TMH, 2007.
3. Banwell and McCash, *Fundamentals of Molecular Spectroscopy*, 4/e, Tata McGraw Hill, 1962.
4. Cotton, Wilkinson and Gaus, *Basic Inorganic Chemistry*, 3/e, John Wiley & Sons, Inc., 1996.
5. I. L. Finar, *A Textbook of Organic Chemistry*, 6/e, Vol. I & II, ELBS, 2006
6. Text Book of Polymer Science, F.W. Billmeyer, Wiley-India Publications