

Subject Code	Course Title	L	T	P	C	Total Hours
	ENGINEERING CHEMISTRY	3	1	0	4	45

### Unit-I: CHEMICAL THERMODYNAMICS

Entropy - entropy changes in isothermal expansion of an ideal gas - reversible and irreversible processes - work & free energy functions - Helmholtz and Gibbs free energy functions - Gibbs-Helmholtz equation - Gibbs-Duhem equation - Clausius-Clapeyron equation & its applications - Van't Hoff isotherm and its applications.

### Unit-II: CHEMICAL KINETICS AND CATALYSIS

Kinetics of second and third order reactions - half life period - saponification of ester - kinetics of opposing, parallel and consecutive reactions and its examples - effect of temperature on reaction rate - theory of absolute reaction rate. Classification and characteristics of catalysts - autocatalysis - steady state principle - enzyme catalysis - Michaelis-menton equation (derivation) - acid base catalysis (derivation).

### Unit-III: THERMAL AND SPECTROSCOPIC TECHNIQUES

Thermogravimetry (TGA) - schematic and block diagram - characteristics of thermo-balance design - methods expressing TG results - applications in qualitative analysis, composition of alloys and mixtures, study of polymers. Differential thermal analysis (DTA) - schematic and block diagram - representation of DTA data - qualitative application (calcium oxalate monohydrate only). Electromagnetic spectrum - Beer Lambert's law (Derivation) - principle, theory, instrumentation and simple applications of: Flame photometry - UV-visible spectroscopy - IR spectroscopy.

### Unit IV: CORROSION - THEORY & PROTECTION

Electrochemical cells - standard electrode potential - electrochemical series - principles of chemical and electrochemical corrosion - factors influencing corrosion - types of corrosion - galvanic corrosion - differential aeration corrosion - stress corrosion - corrosion control - cathodic protection and sacrificial anode - corrosion inhibitors - protective coatings - constituents, functions and uses of paints and varnishes.

### Unit-V: POLYMERS AND NANOMATERIALS

Polymer Chemistry: Monomers - functionality - polymers - degree of polymerization - effect of polymer structure on properties - addition, condensation, co-polymerization - mechanism of addition polymerization (free radical polymerization only). Nanomaterials: Introduction - synthesis of nano materials by physical and chemical methods - ball milling - chemical vapour deposition - sol-gel method - applications of nano materials.

#### Text Book

1. *Engineering Chemistry*, P.C. Jain and Monika Jain, Dhanpat Rai Publishing Co Pvt. Ltd., New Delhi, **2008**.

#### Reference Books

1. *Principles of Physical Chemistry*, B.R. Puri, L.R. Sharma and Madan S. Pathania, Shoban Lal Nagin Chand & Co., Jalandhar, **2000**.

2. *Physical Chemistry for Engineers*, P.C. Jain and Renuka Jain, Dhanpat Rai & sons, New Delhi, **2001**.

3. *Applied Chemistry*, K. Sivakumar, Anuradha Publications, Chennai, **2009**.

4. *Chemistry in Engineering & Technology*, J.C. Kuriacose and J. Rajaram, Vol. 1, Tata McGraw-Hill, New Delhi, **1996**.