

ANNA UNIVERSITY

from the Academic Syllabus

(Syllabus for B.E., / B.Tech., Degree Course)

Regulations 2015

CY 7151 - ENGINEERING CHEMISTRY

Common to all branches of B.E., / B.Tech.

UNIT I: POLYMER CHEMISTRY

9

Introduction: Functionality – degree of polymerization. Classification of polymers – natural and synthetic, thermoplastic and thermosetting. Types and mechanism of polymerization: addition (free radical, cationic, anionic and living); condensation and copolymerization. Properties of polymers: T_g, tacticity, molecular weight – weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension.

UNIT II: SURFACE CHEMISTRY AND CATALYSIS

9

Adsorption – Types of adsorption – adsorption of gases on solids – adsorption from solutions – Types of isotherms – Freundlich adsorption isotherm, Langmuir adsorption isotherm. Industrial applications of adsorption.

Catalysis: Characteristics and types of catalysts – homogeneous and heterogeneous – auto catalysis. Enzyme catalysis – factors affecting enzyme catalysis, Michaelis-Menton equation. Industrial applications of catalysts.

UNIT III: PHOTOCHEMISTRY AND SPECTROSCOPY 9

Photochemistry: Laws of photochemistry – Grothuss-Draper Law, Stark-Einstein law and Lambert-Beer Law. Photo processes – internal conversion, inter-system crossing, fluorescence, phosphorescence, chemiluminescence and photo-sensitization.

Spectroscopy: Electromagnetic spectrum – absorption of radiation – electronic, vibrational and rotational transitions. Width and intensities of spectral lines. Spectrophotometric estimation of Iron. UV-Vis and IR spectroscopy – principles, instrumentation (Block diagram) and applications.

UNIT IV CHEMICAL THERMODYNAMICS 9

Second law: Entropy – entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Free energy and work function: Helmholtz and Gibbs free energy functions; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius Clapeyron equation; Maxwell relations – Van't Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation – variation of chemical potential with temperature and pressure.

UNIT V: NANO CHEMISTRY 9

Basics – distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Preparation of nanoparticles – sol-gel and solvothermal. Preparation of carbon nanotube by chemical vapour deposition and laser ablation. Preparation of nanowires by VLS growth, electrochemical deposition and electro spinning. Properties and uses of nanoparticles, nanoclusters, nanorods, nanotubes and nanowires.

TOTAL : 45 PERIODS

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