

ANNA UNIVERSITY

from the Academic Syllabus

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

Regulations 2019

CY 5151 - 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 – Structure, Properties and Uses of: PE, PVC, PC, PTFE, PP, Nylon 6, Nylon 66, Bakelite, Epoxy; Conducting Polymers – Polyaniline and Polypyrrole.

UNIT II: NANOCHEMISTRY

9

Basics – Distinction between Molecules, Nanomaterials and Bulk Materials; Size – Dependent Properties. Types – Nanoparticle, Nanocluster, Nanorod, Nanowire and Nanotube. Preparation of Nanomaterials: Sol-Gel, Solvothermal, Laser Ablation, Chemical Vapour Deposition, Electrochemical Deposition and Electro Spinning. Characterization – Scanning Electron Microscope and Transmission Electron Microscope – Principle and Instrumentation (Block Diagram) Properties (Optical, Electrical, Mechanical and Magnetic) and Applications of Nanomaterials – Medicine, Agriculture, Electronics and Catalysis.

UNIT III: PHOTOCHEMISTRY AND SPECTROSCOPY 9

Photochemistry: Laws of Photochemistry - Grotthuss-Draper Law, Stark-Einstein Law and Lambert – Beer Law (Derivation and Problems). Photo Physical Processes – Jablonski Diagram Chemiluminescence, Photo-Sensitization and Photoquenching – Mechanism and Examples. Spectroscopy: Electromagnetic Spectrum – Absorption of Radiation – Electronic, Vibrational and Rotational Transitions Width and Intensities of Spectral Lines. Atomic Absorption Spectroscopy, UV-Vis and IR Spectroscopy – Principles, Instrumentation (Block Diagram) And Applications.

UNIT IV: ENERGY CONVERSIONS AND STORAGE 9

Nuclear Fission – Controlled Nuclear Fission – Nuclear Fusion – Differences between Nuclear Fission and Fusion – Nuclear Chain Reactions – Nuclear Energy – Light Water Nuclear Power Plant – Breeder Reactor – Solar Energy Conversion – Solar Cells – Wind Energy. Batteries - Types of Batteries – Primary Battery (Dry Cell), Secondary Battery (Lead Acid, Nickel-Cadmium and Lithium-Ion-Battery) – Fuel Cells – H_2 - O_2 and Microbial Fuel Cell. Explosives – Classification, Examples: TNT, RDX, Dynamite; Rocket Fuels and Propellants – Definition and Uses.

UNIT V: WATER TECHNOLOGY 9

Water – Sources And Impurities – Water Quality Parameters: Colour, Odour, pH, Hardness, Alkalinity, TDS, COD and BOD. Boiler Feed Water – Requirement – Troubles (Scale & Sludge, Caustic Embrittlement, Boiler Corrosion And Priming & Foaming. Internal Conditioning – Phosphate, Calgon and Carbonate Treatment External Conditioning - Zeolite (Permutit) and Ion Exchange Demineralization. Municipal Water Treatment Process – Primary (Screening, Sedimentation And Coagulation), Secondary (Activated Sludge Process and Trickling Filter Process) and Tertiary (Ozonolysis, UV Treatment, Chlorination, Reverse Osmosis).

TOTAL : 45 PERIODS

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