

Faculty of Engineering & Technology

SYLLABUS

M.Sc. (Polymer Science and Technology)

ORGANIC CHEMISTRY:

Structure Bonding, Mechanism of Organic reactions, Alkanes, Alkenes, Dienes and Alkynes, Cycloalkanes, Cycloalkenes, Arenes and Aromaticity, Alkyl and Aryl halides, Stereochemistry of Organic Compounds. Alcohols, Phenols, Ethers, Epoxides, Aldehydes, Ketones and Active methylene Compounds, Carboxylic Acids and derivatives, Compounds of Nitrogen, Organometallic Compounds, Organo-sulphur compounds, Heterocyclic Compounds, Carbohydrates, Amino Acids, Peptides, Proteins and Nucleic Acids, Fats, Oils and Detergents, Synthetic Polymers, Synthetic Dyes, Polynuclear aromatic hydrocarbon.

PHYSICAL CHEMISTRY:

Gaseous State, Liquid State, Solid State, Colloidal State, Solutions, Chemical Kinetics and Catalysis. Thermodynamics, Chemical Equilibrium, Phase Equilibrium, Electrochemistry, Quantum Mechanics, Rotational, Vibrational and Electronic Spectroscopy. Photochemistry, Physical Properties and Molecular Structure.

INORGANIC CHEMISTRY:

Atomic Structure, Periodic Properties, Chemical Bonding -Covalent Bond, Ionic Solids, Weak Interactions, diborane, oxides and oxyacids of Phosphorous, Interhalogen Compounds, Silicones and Phosphazenes. Acids and Bases, Hard and Soft Acids and Bases (HSAB), Chemistry of Noble Gases, Non-aqueous Solvents. Chemistry of Elements of first, second and third Transition Series, Lanthanide and Actinides compounds, Coordination Compounds, Metal-ligand Bonding in Transition Metal Complexes, Valence Bond and Crystal field Theories, Magnetic and electronic Properties of Transition Metal Complexes, reaction mechanism, Basics of Organometallic Chemistry, Bioinorganic Chemistry.

INSTRUMENTAL METHOD OF ANALYSIS:

Error and Treatment of Analytical Data: accuracy and precision, significant figures, standard deviation. Criteria for rejection of data-Q-test, Student t-test, F-test, Chi square test, least squares method. Separation techniques: Chromatography: Size Exclusion, Ion-Exchange.

HPLC, GC. Spectroscopy: Basics of electronic transitions in UV-visible, Effect of solvent and conjugation on λ_{max} . Woodward Fieser rule. IR Spectroscopy, stretching and bending modes, functional and fingerprint region. The basics of NMR spectroscopy, Chemical shift and its measurement. Factors influencing; chemical shift: Shielding, deshielding and anisotropic effects, Basic concepts of X-ray diffraction, Bragg's law, crystal systems.

ENVIRONMENTAL CHEMISTRY:

Components of the Environment, atmospheric structure (Troposphere, stratosphere, mesosphere, and ionosphere), atmospheric reactions: Reactions involving nitrogen oxides, Sulfur dioxide oxidation, and organic compounds oxidation. Particulate pollutants: Photochemical smog and formation of Peroxyacyl nitrate (PANs). Formation and depletion of Ozone in the atmosphere. Basics of water Pollutants and wastewater Treatment. International Standards for Drinking Water, Strategies to control environmental pollution, Green Chemistry in day-to-day Life.

POLYMERS:

Definition, Classification of Polymers of Polymers (based origin, thermal response, structure, tacticity etc) Types of Polymerisation Reactions , Preparation, properties and uses of some important thermoplastic and thermosetting polymers: Polythene, PVC, Teflon, Polyamides (Nylon 6,6 and nylon 6), polyester, Bakelite, melamine-formaldehyde resins. Rubber: Natural rubber, vulcanisation of rubber, synthetic rubbers (Neoprene, Buna-N and Buna-S). Molecular mass of Polymers, Biodegradable Polymers, Polymers of Commercial Importance.