

Name of the Programme: M.Sc. Part-II (Organic Chemistry)

Course Code: CHO-621 **Title of the course:** Polymer Chemistry: Concepts,
Synthesis and Processing

Number of Credits: 4

Effective from AY: 2023-24

Prerequisites for the course	Students should have studied M.Sc. Part-I Chemistry.	
Course Objective	1. To introduce various concepts in organic polymer chemistry. 2. To understand the synthesis, polymer processing and applications.	
Content	1. Brief history of natural and synthetic polymers Classification & nomenclature of polymers, functionality concept-linear, -branched and -cross linked polymers. Introduction to biodegradable polymers.	No of hours 5
	2. Methods and chemistry of polymerization Bulk, solution, suspension, emulsion, addition, condensation polymerizations. Free-radical, Ionic and coordination polymerization reactions. Introduction to controlled free radical polymerization. Carothers equation in condensation polymerizations.	12
	3. Properties of polymers a. Number and weight average molecular weights, Molecular weight distribution, polydispersity. b. Glassy state and glass transition temperature, crystallinity in polymers. c. Characterization of polymers.	10
	4. Resources for monomers, manufacture of important monomers and reagents Ethylene, propylene, butadiene, isoprene, styrene, divinyl benzene, acrylonitrile, vinyl chloride, adipic acid, urea, bisphenol-A, melamine, phthalates, glycol, glycerol, ethylene oxide, epichlorohydrin, ϵ -caprolactum, di-isocyanates, pentaerythritol, allylic carbonate monomers.	12
	5. Synthesis, properties and applications of polymers a. Vinyl polymers-LDPE, HDPE, PVC, PVA, polyvinyl acetate, polyacrylates, methacrylates, polystyrene, teflon, ABS, SBR, SAN. b. Condensation polymers- Nylons, polyesters, polyurethanes, polycarbonates. c. Thermoset polycarbonates like CR-39 Cellulose esters-cellulose acetate, nitrates and acetatebutyrates. d. Thermoset resins- phenol-formaldehyde, melamine-	14

	<p>formaldehyde, epoxy resins - their curing.</p> <p>e. Natural rubber.</p>	
	<p>6. Additives in polymers and Polymer processing</p> <p>a. Lubricants, plasticizers, stabilizers, antioxidant, fire retardants, blowing agents, fillers, colorants, crosslinking agents, UV-Vis degradants etc.</p> <p>b. Introduction to compounding, and processing techniques like calendaring, casting, moulding and spinning in polymer processing.</p>	7
Pedagogy	<p>Mainly lectures and tutorials. Seminars / term papers / assignments / presentations / self-study or a combination of some of these can also be used. ICT mode should be preferred. Sessions should be interactive in nature to enable peer group learning.</p>	
References / Readings	<ol style="list-style-type: none"> 1. V. R. Gowarikar, N.V. Vishwanathan, J. Sreedhar, Polymer Science, New Age International, 2015. 2. J. R. Fried, Polymer Science and Technology, PHI Pvt. Ltd., 2000. 3. R. Sinha, Outlines of Polymer Technology: Manufacture of Polymers, PHI Pvt Ltd., 2000. 4. K. Y. Saunders, Organic Polymer Chemistry, Chapman and Hall, UK, 1976. 5. H. R. Kircheldorf, Handbook of Polymer Synthesis, PART A and B, Marcel Dekker Inc., 1992. 6. R. P. Brown, Handbook of Plastic Test Methods, 2nd Ed., George Godwin Ltd., 1981. 7. M. P. Stevens, Polymer Chemistry- An Introduction, 2nd Ed., Oxford Univ. Press, 1990. 8. W. Y. Mijs, New Methods in Polymer Synthesis, Plenum Press Ltd., NY, 1992. 9. M. Arora, Polymer Chemistry, Anmol Publications 2001. 10. C. E. Carraher, Polymer Chemistry, New York M. Dekker 2005. 11. P.C. Hiemenz, Polymer Chemistry, CRC Press, 2007. 12. V. K. Selvaraj, Advanced Polymer Chemistry, New Delhi Campus books, CRC Press, 2008. 13. A. Ravve, Principles of polymer Chemistry, Springer 2012. 14. J. David, Polymers, Oxford University Press 2015. 	
Course Outcome	<ol style="list-style-type: none"> 1. Students will be in a position to understand and evaluate the differences in structures and properties of small molecules and macromolecules. 2. Students will be in a position to apply concepts involved in polymer synthesis, characterization and processing. 3. Students will be in a position to understand and apply concepts of synthesis and applications of organic polymers. 4. Students will understand properties of polymers 	

Name of the Programme: M.Sc. Part-II (Organic Chemistry)

Course Code: CHO-622 **Title of the course:** Concepts in Medicinal Chemistry

Number of Credits: 4

Effective from AY: 2023-24

Prerequisites for the course:	Students should have studied the chemistry courses in M.Sc. Part I level.	
Course Objective:	1. To understand the concepts of drug discovery and development 2. To learn drug screening, target identification, lead discovery, optimization 3. To understand molecular basis of drug design and drug action	
Content	1. Introduction to Drugs Requirement of an ideal drug, sources of drugs, important terms used in chemistry of drugs, classification and nomenclature of drugs, drugs and the medicinal chemists. a. Drug Design: Analogues and pro-drugs, concept of lead compounds, features governing drug design – the method of variation, drug design through disjunction, conjunction, tailoring of drugs, cimetidine – a rational approach to drug design. b. Drug Development: Screening of natural products, isolation and purification, structure determination, structure-activity relationship, QSAR, synthetic analogues, natural products as leads for new pharmaceuticals, receptor theories, oxamniquine – a case study	No of hours 15
	2. Mechanism of drug action Introduction, enzyme stimulation, enzyme inhibition, membrane-active drugs, polymorphism and drug delivery.	10
	3. Study of Pharmacodynamic Agents (minimum two examples for each) a. Local anesthetics b. Analgesics : narcotic and non-steroidal anti-inflammatory, narcotic antagonists c. Antiepileptic drugs d. Antiparkinsonism drugs e. Antihistaminics f. Sedatives and hypnotics g. Antipsychotics h. Cardiovascular agents : Cardiovascular diseases, Antianginal agents and vasodilators, Antihypertensive agents, Antiarrhythmic drugs, Adrenergic blocking agents	15