VASAVI COLLEGE OF ENGINEERING (A)
DEPARTMENT OF CHEMISTRY
OPEN ELECTIVE *(General Pool)*
B E III SEMETER

POLYMERIC MATERIALS

Instruction	: 2Hour / Week	SEE- Marks	: 60	Course Code	: U23OE310CH
Credit	: 2	CIE- Marks	: 40	SEE- Duration	: 2Hours

OBJECTIVES	OUTCOMES
The course will enable the students:	**At the end of the course students should be able to:**
1.To familiarize with various types of polymers 2. To acquaint with different methods of polymerization. 3.To converse the different polymerization techniques 4. To familiarize with various high performance/ specialty polymers.	1. Classify the polymers. 2. Analyze the different polymerization methods and their mechanisms. 3. Discuss the polymerization techniques used for the selected polymers. 4. Discuss the synthesis, properties and applications of selected polymers.

CO-PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	-	-	-	-	-	1	-	-	-	-	1
2	3	1	-	-	-	-	1	-	-	-	-	1
3	3	-	-	-	-	-	1	-	-	-	-	1
4	3	-	-	-	-	-	1	-	-	-	-	1

UNIT-I: INTRODUCTION TO POLYMERS AND TYPES: (5H)

Introduction to various engineering materials, brief history of polymers, importance of polymers in engineering, terminology- ,classification of polymers- a) based on mechanism, b) based on chain topology, c) based on end use d) linear, branched and cross linked polymers e) based on physical state, Nomenclature based on source and based on IUPAC, applications of polymers.

UNIT-II: POLYMERIZATION: (7H)

Initiators- Types of Initiators, Thermal Decomposition of Initiators, Redox Initiation, Photochemical Initiation, Initiation by Ionizing Radiation, Pure Thermal Initiation, Other Methods of Initiation, Initiator Efficiency, Definition -Mechanism - Cage Effect.Step-Reaction (Condensation) Polymerization, Polymerization Mechanisms- Mechanism of Stepwise Polymerization, Radical Chain (Addition) Polymerization, Chain Polymerization, Ionic and Coordination Chain (Addition) Polymerization, Cationic Polymerization, Anionic Polymerization, Copolymerization - Mechanisms of Copolymerization, Block and Graft Copolymers

UNIT-III: TECHNIQUES OF POLYMERIZATION: (7H)

Living Radical Polymerization - General Considerations, Atom Transfer Radical Polymerization (ATRP) - Polymerization Mechanism, Stable Free-Radical Polymerization (SFRP), Radical Addition–Fragmentation

Transfer (RAFT) -and Other Living Radical Polymerizations.process conditions -bulk (mass) polymerization - solution polymerization- emulsion & suspension polymerization - heterogeneous polymerization - other processes; self-assembly and nanostructures.

UNIT-IV: COMMERCIAL & HIGH-PERFORMANCE POLYMERS: (7H)

Synthesis, properties and applications of commercial polymers: polyvinyl chloride, polystyrene

Requirements for High-Temperature Polymers.

Synthesis, properties and applications of

1) Aromatic polyethers: Polyether sulfone,
2) Liquid crystal polymers: poly(oxy-1,4-phenylenecarbonyl),
3) Inorganic polymers – Minerals - Glasses – Ceramics,
4) Organometallic polymers – Poly silanes.

Text Books:

1. George Odian, Principles of Polymerization Fourth Edition, University of New York.
2. Fred w. Billmeyer, Textbook of Polymer Science Third Edition, New York
3. P.C.Jain and Monica Jain, "Engineering Chemistry", DhanpatRai Pub, Co., New Delhi (2002)
4. Shasi Chawla, "Text Book of Engineering Chemistry", Dhanpat Rai Publishing Company, NewDelhi (2008).

Learning Resources:

1. D. Dhara, NPTEL Polymer Chemistry Course, IIT Kharagpur.
2. Gowarikar R V, Polymer Chemistry.

SEE: 60 Marks	CIE: 40 Marks
Average of 2 Internals	: 30 Marks each
Average of 2 Assignments	: 5 Marks each
Average of 2 Quizzes	: 5 Marks each