

KU5DSECHE305: POLYMER CHEMISTRY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
V	DSE	300	KU5DSECHE305	4	60

Learning Approach (Hours/ Week)		Marks Distribution			Duration of ESE (Hours)
Lecture/ Tutorial	Practical/ Internship	CE	ESE	Total	
4	0,	30	70	100	2

Course Description: The course comprises of modules which describe different types of polymers, their characteristics, various techniques of polymerisation, advances in polymers and a teacher specific module.

Course Prerequisite:

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Classify polymers and explain properties of polymers	U
2	Illustrate the preparation, properties and applications of polymers	A
3	Interpret the scientific mechanism of polymerization	A
4	Acquaint to apply various polymer processing technologies and explain thermal methods of analysis	An
5	Know the recent advances in polymer chemistry	U

***Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)**

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	0	3	3	0	1
CO 2	3	3	0	3	3	0	0
CO 3	3	3	0	3	3	0	1
CO 4	3	3	0	3	3	0	0
CO 5	3	3	0	3	3	0	1

Course Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HOURS
		. INTRODUCTION	14
1	1	Definition of monomer, polymer and polymerization – Classification of polymers - natural, semi-synthetic and synthetic - condensation & addition polymers - Linear, branched and cross-linked polymers - Homo polymers and copolymers	
	2	Graft and block copolymers, composites, blends, elastomers, fibres, plastics, thermoplastic and thermosetting polymers-Tacticity in polymers-Isotactic, syndiotactic and atactic polymers.	
	3	Properties of polymers: Glass transition temperature (T _g) - Definition- Factors affecting T _g - relationships between T _g and molecular weight and melting point. Importance of T _g .	
2	PLASTICS, RUBBERS AND FIBRES		12

	1	Preparation, properties and applications of - Plastics: Polyethylene, Polyvinylchloride, polymethylmethacrylate, polyethylene terephthalate, Teflon, Bakelite	
	2	Rubbers: natural and synthetic rubbers – polybutadiene, polyisobutylene, butyl rubber, nitrile rubber, BUNA-S, BUNA N, neoprene rubber.	
	3	Synthetic fibres: Nylon 66, Nylon 6, Rayon	

	POLYMERISATION TECHNIQUES		12
3	1	Types of polymerizations- addition (initiation, propagation and termination), condensation, ionic (cationic & anionic), Ring opening polymerizations (epoxy resins) coordination polymerization	
	2	Ziegler Natta catalyst - moulding of plastics into articles- compression moulding – injection moulding - blow moulding - extrusion moulding – Calendaring – Spinning	

	ADVANCES IN POLYMERS		10
4	1	Biopolymers - biodegradable polymers - Polymers in medical field -.	
	2	High temperature and Fire-resistant polymers - Conducting polymers PAC, PPP, PPY etc	
	3	Polymers used as adhesive and coatings, liquid crystalline polymers, Vulcanization of rubber	
	4	Environmental Hazards of plastics and recycling	

5	TEACHER SPECIFIC MODULE		12
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	Directions: <i>Polymer Composites-Types -preparation- Properties-applications or any other relevant topic</i>	
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References:

1. V.R. Gowariker, N.V. Viswanathan and Sreedhar, Polymer Science, Wiley Eastern Ltd.
2. F.W. Billmeyer, A text book of polymer science, John Wiley & Sons, 1971.
3. Maurice Morten, Rubber Technology, Van Nostrand, Reinold, New York.
4. S. Paul, Surface Coatings.
5. B.K. Sharma, Polymer Chemistry, Goel Publishing House, Meerut.
6. M. Jenkins, Biomedical Polymers, University Birmingham, U.K.
7. M.G. Arora, M. Singh and M.S. Yadav, Polymer Chemistry, 2nd Revised edition, Anmol Publications Private Ltd.

Assessment Rubrics:

Evaluation Type		Marks
End Semester Evaluation (ESE)		70
Continuous Evaluation (CCA)		30
Theory (CCA)		30
a)	Test Paper*	12
b)	Assignment	6
c)	Seminar, Viva-Voce	12
Total		100

*Average mark of the best two written tests may be considered for internal mark.