GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering (Minor/Honours Degree Syllabus)

Subject Code : 116AS01

Subject Name : Biodegradable Materials

WEF Academic Year :	2022-23
Semester :	6
Category of the Course :	Compulsory

Prerequisite : Students should have basic knowledge of degradation.

Rationale :

This course is designed to have in-depth knowledge of properties of biodegradable materials, its synthesis and application in various fields. Study of biodegradable materials enhances the reduction in adverse effects on the environment.

Course Scheme :

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
				Theory		Practical		
L	T	PR	C	ESE (E)	PA(M)	ESE (V)	PA (I)	
03	00	02	04	70	00	30	00	100

Course Content :

Sr. No.	Course Content	No. of Hours	% of Weightage
1	Biodegradable materials: Introduction, classes, need of biodegradable materials, standards for biodegradability.	4	10
2	Biodegradable polymer: Introduction, biodegradable polymers, Classification of biodegradable polymers, biobased plastics, Advantages of biopolymers, Barriers to Biopolymer Commercialization, Overview of plant polymers-Overview, Resources and application.	8	20
3	Types of Biodegradable Polymers Bio based polymers, Starch based polymers, Cellulose based polymers, Chitin and Chitosan, Bacterial Polyesters, Synthetic Biodegradable Polymers, Polymers from Bio Based Monomers, Synthesis of all types of polymers and its limitation and application.	8	20
4	Degradation of polymers – Mechanisms and Evaluation Methods Introduction, Defining Biodegradability, Mechanisms of Polymer Degradation-Nonbiological Degradation of Polymers, Measuring Biodegradation of Polymers- Enzyme assays, Plate test, Respiratory test, Natural environment, Field trial, Gas evolution test, Factors Affecting Biodegradability.	7	20

5	Biodegradable Green composite: Introduction, nanofillers, nano composites form renewable sources, Processing, application, Nano-cellulose based nanocomposites: composite metrices, composite property, starch based composites,: Introduction, processing, properties, applications.	8	20
6	Applications of biodegradable material in various fields: food packaging, textile, construction, electronics, energy, biomedical etc.	7	10
	Total	**42**	

Reference Books :

1) Handbook of Biodegradable Polymers :Catia Bastioli.
2) Biopolymers and biomaterials: Padinjakkara, Aneesa Souza, Fernando Gomes Thankappan.
3) Handbook of Biopolymers and Biodegradable Plastics, Properties, Processing and Applications.
4) Biodegradable Green Composites by Sushila Kalia, Wiley.

Course Outcome :

After Completion of the Course, Student will able to :

Sr. No.	Course Outcomes	RBT Level*
1	CO 1 – Describe the basic characteristics and applications of biodegradable materials.	RM
2	CO 2 – Classify various types of biodegradable polymers.	UN
3	CO 3 – Evaluate the degradation mechanism of biodegradable polymers.	EL
4	CO 4 – Apply the knowledge of various synthesis techniques for manufacturing of biodegradable polymers and green composites.	AP

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

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