

7 th Semester	RPL7D005	Biodegradable Plastics	L-T-P 3-0-0	3 Credits
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Module-I:**(14 hours)****Introduction, classification, and sources of biodegradable polymers**

Biodegradable Polymers; Introduction, Definition, Defining biodegradability, Importance, Classification.

Degradation mechanism; hydrolytic scission, enzymatic hydrolysis.

Properties; Environmental Impact of bioplastics, advantages and disadvantages bioplastics/ biopolymers

Module-II:**(14 hours)****Structure, derivatives, and properties of Biodegradable & Compostable polymers from renewable and non-renewable resources;**

Derived from renewable resources; cellulose acetate, Oils and fats of plant, Hydroxylation (ring opening) of vegetable oil, vegetable oil as feedstock for Polyurethane polymers, Lignin and hemicellulose, natural rubber, thermoplastic starch.

Animal origin; Chitosan, silk, Collagen, & elastin

Bacterial Origin: Bacterial cellulose, Poly (Hydroxyalkanoates), Alginates, Carrageenan

Derived from non-renewable resources; PVA, Aliphatic & aromatic co polyesters.

Module-III:**(8 hours)****Applications and testing of biodegradable plastics**

Criteria used in the evaluation of biodegradable plastics; choosing the most appropriate methodology, description of current standards and test methods.

Bioplastics applications: Food packaging, edible films, coatings, automotive, Agricultural, membranes, tissue engineering & biomedical applications, composite applications, role in sustainable development and miscellaneous applications.

Current market of biodegradable plastics.

[1] Biodegradable Polymers for Industrial Applications : Ray Smith, Woodhead Publications., England, 2005

[2] Renewable Resources for Functional Polymers and Biomaterials: Park, RSC, Cambridge, 2011

[3] Biopolymers : R.M. Johnson, L.Y. Mwaikambo and N. Tucker, RAPRA, UK, 2003

[4] Green Composites: Polymer Composites & the environment: Caroline Bathe, CRC Press, Boca Raton, 2004

[5] Biodegradable Polymers and Plastics; Emo Chiellini and Roberto Solaro University / Pisa Pisa, Italy. (Originally published by Kluwer Academic I Plenum Publishers, New York in 2003 Softcover reprint of the hardcover 1st edition 2003)