- Recovery of BHET from PET by chemical recycling process
- Recovery of Adipic Acid from Nylon 66 by chemical recycling technique
- To study the effect of vulcanized rubber at varying ratio (in powder form) on mechanical properties of rubber vulcanizate
- Preparation of plasticizer from polyester waste.
- Preparation of reclaim from tyre waste.

ESSENTIAL/RECOMMENDED READINGS

- Chandra, R., & Adab, A. (1994). Rubber & Plastic Waste: Recycling, Reuse and Future Demand. CBD Publishers.
- Scheirs, J., & Long, T. E. (Eds.). (2005). Modern polyesters: chemistry and technology of polyesters and copolyesters. John Wiley & Sons.

SUGGESTIVE READINGS

- Blow, S. (1998). Handbook of Rubber Technology.
- Brandrup, J., Bittner, M., Michaeli, W., & Menges, G. (1996). Recycling and Recovery of Plastics, Hanser. Gardner, München.
- Goodship, V. (2007). Introduction to plastics recycling. iSmithers Rapra Publishing.
- Brydson J.A., (2016) Plastics Materials, Butterworth Heinemann, 8th Edition.
- Ehrenstein G.W., Riedel G., Trawiel P., (2004) Thermal analysis of plastics, Hanser.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

GENERIC ELECTIVES (GE-4)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
BIOMEDICAL APPLICATIONS OF POLYMERS	**4**	**2**	**0**	**2**	**Class 12th with Physics, Chemistry**	**----**

Learning objectives

- To acquire knowledge of biopolymer and biodegradation
- To gain knowledge of applications and testing of biopolymers

Learning outcomes

After studying this paper, students will be able to

- Explain basic concepts and requirement of biomaterials and biocompatibility
- Apply the knowledge of various biomaterials for a desired bio-application

SYLLABUS OF GE-2

THEORY COMPONENT-

UNIT – 1 (6 Hours)

BASICS OF BIOMATERIALS

Concept of biocompatibility and biodegradability, responsiveness, estimations of degradation and biocompatibility, Important biomaterials: hydrogel, fibres, bio-ceramics, bio-elastomers and membranes

UNIT – 2 (8 Hours)

POLYMERS AS BIOMATERIALS

Polyester and polysaccharides, natural gums, biodegradable polymers, polymers and hydrogels

UNIT – 3 (8 Hours)

BIOMATERIALS FOR ORGAN TRANSPLANTS AND TISSUE ENGINEERING

Properties and applications of polymers for organ transplant e.g. dental cement, orthopaedic, skin, artificial kidney etc., basic concepts of tissue engineering, important polymers for tissue engineering: cellulose, chitosan and alginates

UNIT – 4 (8 Hours)

DRUG DELIVERY AND WOUND CARE

Introduction to drug delivery, polymers in controlled drug delivery, dressing strips, polymer drug vessels, core shell and nanogels, polymers for antimicrobial activity, bio-conjugates

PRACTICAL COMPONENT (60 Hours)

- Evaluate the biocompatibility of polymeric samples.
- Determination of the degradation behavior of polymers such as thermal, hydrolytic degradation etc.
- Preparation of membranes and measurement of absorption behavior.
- Preparation and characterization of dental cement.
- Preparation of a hydrogel and its characterization.
- Determination of tensile strength of biopolymers.
- Determine the swelling rate of biopolymers
- Preparation of nanogel and find its water absorption
- preparation and characterization of membrane for skin transplant

ESSENTIAL/RECOMMENDED READINGS

- Tiwari A., Tiwari A., (2013) Nanomaterials in drug delivery, Imaging and Tissue Engineering, Wiley.
- Pilla S., (2011) Handbook of Bioplastics and Biocomposites Engineering Applications, Wiley.
- Ratner, Buddy D., Allan S. Hoffman, Frederick J. Schoen, and Jack E. Lemons. "Biomaterials science: an introduction to materials in medicine." San Diego, California (2004): 162-4.
- Park, J. B., & Bronzino, J. D. (2002). Biomaterials: principles and applications. crc press.

SUGGESTIVE READINGS

- Ratner D., Hoffman A.S., (1996) An Introduction to Materials in Medicine, Academic Press.
- Saltzman W.M., (2001) Drug delivery–Engineering principles for drug therapy, Oxford University Press.
- Kalia S., Averous L., (2011) Biopolymers: Biomedical and Environmental Applications, John Wiley & Sons.

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