

## COMMON POOL OF GENERIC ELECTIVES (GE) COURSES OFFERED BY THE DEPARTMENTS

### 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		
<b>BASICS OF POLYMER SCIENCE</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>Class 12<sup>th</sup> with Physics, Chemistry</b>	<b>---</b>

### Learning objectives

The Learning Objectives of this course are as follows:

- To familiarize with the structure of polymers will be introduced to students.
- To acquaint students with knowledge of molecular weight determination and polymer solubility

### Learning outcomes

After studying this paper, students will be able to

- Distinguish crystalline and amorphous states of polymers
- Correlate polymer flexibility with the glass transition temperature
- Illustrate structure-property relationship of polymers
- Apply mathematical formulae to depict polymer solution properties

## SYLLABUS OF GE-1

### THEORY COMPONENT-

#### UNIT – I

**(10 Hours)**

Introduction and classification of polymers, configuration and conformation of polymers, nature of molecular interaction in polymers, entanglement, various structures of copolymers such as linear branched and cross-linked copolymers, Polymer solutions, solubility parameter, solution viscosity, polymer solubility, thermodynamics of polymer solutions

## UNIT – 2

(10 Hours)

Physical properties, stress–strain behaviour, mechanical properties (tensile, flexural, impact, fatigue, hardness, creep, abrasion), introduction to flow & glass transition temperature ( $T_g$ ) and its measurement of  $T_g$ , factors affecting the glass transition temperature

## UNIT – 3

(10 Hours)

Nature and structure of polymers – structure-property relationships, Molecular weight of polymers ( $M_n$ ,  $M_w$  etc.), polydispersity, molecular weight distribution and determination of molecular weight by viscosity, end group analysis, cryoscopy, ebulliometry, light scattering & ultracentrifugation methods

## PRACTICAL COMPONENT

(60 Hours)

- Chemical identification of polymers: Functional groups (associated with polymers).
- Determination of molecular weight by solution viscosity/end group analysis.
- To check the solubility of the given polymeric sample in different solvents.
- To determine the melting point of crystalline polymers.
- Determination of heat deflection temperature & vicat softening point of polymers.
- Determination of Acid value of acrylic acid
- Estimation of hydroxyl value by PVA and Cyclohexanol
- Determination of epoxy equivalent weight of the epoxy resin.
- Determination of saponification value of oil.
- Study of three component systems.

## ESSENTIAL/RECOMMENDED READINGS

- Brydson J.A., (2016) *Plastics Materials*, Butterworth Heinemann, 8<sup>th</sup> Edition.
- Ghosh P., (2010) *Polymer Science and Technology: Plastics, Rubbers, Blends and Composites* Tata McGraw-Hill.
- Gowarikar V.R., (2019) *Polymer Science*, New Age International Publishers Ltd, 3<sup>rd</sup> Edition
- Billmeyer F.W., (2007) *Textbook of Polymer Science*, Wiley, India.
- Shah V., (1998) *Handbook of Plastics Testing Technology*, Wiley interscience publications.

## SUGGESTIVE READINGS

- Schultz J.M., (2001) Polymer Crystallization, American Chemical Society.
- Seymour R.B., Carraher C.E., (2000) Polymer Chemistry, Marcel Dekker.

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

## GENERIC ELECTIVES (GE-2)

### 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		
ADVANCED ANALYTICAL TECHNIQUES	4	2	0	2	Class 12 <sup>th</sup> with Physics, Chemistry	---

### Learning objectives

The Learning Objectives of this course are as follows:

- To acquaint the students with the advanced instrumental techniques and their applications in characterization of polymeric materials.

### Learning outcomes

After studying this paper, students will be able to

- Elucidate surface morphology of polymeric materials
- Determine crystallinity of various polymers and their characterization on the basis of their thermal stability and glass transition temperature

## SYLLABUS OF GE-2

### THEORY COMPONENT-

#### UNIT – I

(8 Hours)