

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 th 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)

Basic principle of spectroscopy, molecular and atomic spectra, Lambert-Beer's law, Frank-condon principle, electromagnetic radiation and its properties, interaction of radiation with matter, statistical method of analysis

UNIT – 2 **(8 Hours)**

Principles and applications in structural determination of polymers (functional group, tacticity, molecular structure, purity, unsaturation etc.): Infra-red spectroscopy, UV-Vis spectroscopy, electron spin resonance, raman, nuclear magnetic resonance spectrometer

UNIT – 3 **(8 Hours)**

Thin layer chromatography, high performance liquid chromatography, gel permeation chromatography (GPC), gas chromatography.

UNIT – 4 **(6 Hours)**

Optical microscopy, electron microscopy (SEM, TEM, AFM) and XRD: basics and applications (size, morphology, crystallinity etc.) in polymers characterization

PRACTICAL COMPONENT **(60 Hours)**

- Study of UV stabilization of polymer samples by UV-visible spectrophotometer.
- Calculate weight percentage of inorganic and organic ingredients in polymeric compounds.
- Determination of K-value of PVC.
- Quantitative determination of impurities by UV-Vis. spectrophotometer.
- Characterization of Filler Content /Ash Content of common polymers by Thermogravimetric Analysis, (TGA).
- Identification of additives in a processed polymer by chromatography.
- Interpretation of FTIR, NMR and Raman spectra of polymers.

ESSENTIAL/RECOMMENDED READINGS

- Willard H.H., Merritt L.L., Dean J.A. (1988) Instrumental method of analysis, Wadsworth Publishing Company.
- Skoog D.A, (1997) Principle of Instrumental Analysis, Harcourt College Pub.
- Shah V., (2007) Handbook of Plastic Testing, Technology, Wiley-Inter science.

- Banwell C.N., McCash E.M., (2008) Fundamentals of Molecular Spectroscopy, Fourth Edition, Tata McGraw-Hill.

SUGGESTIVE READINGS

- Tanaka T., (1999) Experimental Methods in Polymer Sciences, Academic Press.
- Silverstein R.M., (1991) Spectrometric identification of organic compounds, John Wiley.
- Macomber R.S., (2008) A complete introduction to NMR spectroscopy, Wiley-inter science.

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GENERIC ELECTIVES (GE-3)

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		
POLYMER AND ENVIRONMET	4	2	0	2	Class 12th with Physics, Chemistry	----

Learning objectives

The Learning Objectives of this course are as follows:

- To give understanding of basics of care to be taken while handling polymer products.
- To know the Safety and hazardous of their manufacturing processes.
- To impart Knowledge of the subject will help students to see the environmental impact of plastic and resin.
- To understand the current benefits and concerns surrounding the use of plastics and look to future priorities, challenges and opportunities.

Learning outcomes

After studying this paper, students will be able to

- Explain the basics of environmental and safety issues in the chemical industry.
- Apply the safety in handling monomer and resins