

SEMESTER-V
BSc. (Hons.) Polymer Science

DISCIPLINE SPECIFIC CORE COURSE – 13

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 (if any)
		Lecture	Tutorial	Practical/ Practice		
FIBRE SCIENCE	4	2	0	2	Class 12th with Physics, Chemistry, Mathematics	-

Learning objectives

- To study the basic concepts of natural and synthetic fibres
- To learn about the basic concepts of spinning including melt and solution spinning.
- To understand various parameters affecting spinning, drawing and heat setting of fibre structure and properties

Learning outcomes

After studying this paper, students will be able to

- Explain classification, structure and properties of natural and synthetic fibres
- Manufacture fibre with desired properties.
- Explain the various spinning variables

SYLLABUS OF DSC-13

UNIT 1:

(4 Hours)

INTRODUCTION TO FIBRES

Introduction, classification, structural requirements of fibre forming polymers, general properties of fibres such as moisture absorption, fineness (tex, denier), tensile properties (elongation at break, elastic recovery, tenacity etc.)

UNIT 2:**(5 Hours)****NATURAL FIBRES**

Brief introduction to structure, properties and application of naturally occurring fibres: vegetable fibres, animal fibres and mineral fibres

UNIT 2:**(10 Hours)****FIBER SPINNING PROCESSES**

Melt spinning process: Spinning line, spinning manifold, spinning pack and manifold, cooling system, spinning variables, Force balance and heat balance in melt spinning; fibre structure development:

Solution spinning process: dry spinning (dope, spinning process, fibre cross section formation) wet spinning (solution preparation, coagulation, effect of process parameters on coagulation and structure of dry and wet spun fibres)

UNIT 3:**(12 Hours)****SYNTHETIC FIBRES**

Structure, properties and applications of synthetic fibres: viscose rayon, cellulose acetate, nylon 6, nylon – 66, polyester, acrylic, carbon fibre and aramid fibres

PRACTICAL COMPONENT**(60 Hours)**

(Students are required to minimum 6 experiments)

- To determine fineness (denier, tex and count) of given fibre, filaments and yarns.
- To study the cross-sectional view of natural and synthetic fibres and to identify them.
- To study the longitudinal view of natural and synthetic fibres and to identify them.
- To investigate moisture regain of fibres by absorption and desorption method.
- To identify fibres through elemental analysis.
- To identify the fibre through solubility tests.
- To analyze the reaction fibres to heat & flame.
- Analysis of chemical structure of fibres by FTIR and UV spectroscopy.
- To study thermal degradation of fibers through Thermo Gravimetric Analysis TGA method.
- To determine composition of fibres in blends.
- To measure electrical resistance of fibres.
- To measure static electricity a static charge in fibres

- To analyze microscopic properties of fibre.
- Quantitative analysis of cellulose/polyester blends.
- R & D Lab visit

ESSENTIAL/RECOMMENDED READINGS

- Cook J.G., (2009), Hand Book of Textile Fibres, Woodhead Publishing.
- Mishra S. P., (2000), A Text Book of Fibre Science and Technology, New Age International Publisher.
- Sperling L. H., (2013), Introduction to Physical Polymer Science, Wiley, 4th Edition
- Gupta V.B., Kothari V.K., (1997) Manufactured Fibre Technology, 1st Ed Chapman and Hall.
- Vaidya A.A., (1988) Production of Synthetic Fibres, First Edition, Prentice Hall of India.

SUGGESTIVE READINGS

- Morton W.E., Hearle J.W.S., (2008) Physical Properties of Fibres, Woodhead Publishing.
- David S. R., (2000) Structure Formation in Polymeric Fibres, First edition, Hanser Publishers.

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

DISCIPLINE SPECIFIC CORE COURSE – 14

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 (if any)
		Lecture	Tutorial	Practical/ Practice		
POLYMER CHARACTERIZATION	4	2	0	2	Class 12 th with Physics, Chemistry, Mathematics	-