NATURAL AND SYNTHETIC FIBRES

Unit I: Introduction to Fibres

Introduction to natural and synthetic polymers. Essential characteristics and molecular architecture of fibre forming polymers. Concept of order in polymers, crystallinity, orientation, physical structure of natural and man-made fibers.

Unit II: Fibre Spinning Process

Physical methods for investigating fiber structure. Optical properties of oriented polymers and fibres, refractive index and birefringence. Fibre spinning process - Melt spinning, dry spinning and wet spinning of fibers. Denier & Tex, crimping properties, length, twists and intermingling. Mechanical Properties, Electrical properties, Shrinkage, uniformity, Frictional properties, Tactile and optical properties.

Unit III: Fibre Orientation and Finishing Process

Fiber drawing, heat setting, texturing, Spun bonding and melt-blowing processes - brief idea about auxiliary plants and Equipment. General principles of finishing and dying of fibers. Common types of finishes applied to textile fibers. Brief outline of manufacture of textiles: Fibers to yarn, Yarns to Fabrics- weaving, knitting, braiding, Compound fabric constructions, Finishing processes, Dyeing and printing.

Unit IV: Natural and Man Made Fibres

Natural fibre: Cotton, linen, jute, hemp, sisal, coir, wool, silk, asbestos etc, chemical structures, source, use and limitations. Quest for synthetic fibers. Conventional man made fibers: Rayon, Polyethylene terephthalate, Nylon 6 and nylon 66, Acrylic fibers, Polyolefin's, Elastomeric. Mechanical properties of fibers based on polyesters, nylons, acrylics, polypropylene.

Fibers for high performance, industrial and non-conventional applications of aramide fibres -Nomex and Kevlar - aromatic polyesters, PEK, PEEK, misscellaneous fibres - Carbon fibre, Glass fibre, Boron fibre, Ceramic fibre, Alumina fibre, Metallic fibre, Optical fiber.

Text Books:

1. A.A. Vaidya, Production of synthetic fibres, Prentice Hall of India Pvt. Ltd., New Delhi,1988.
2. Billmeyer Jr.; Fred W., Synthetic Polymers, Doubleday and Co. Inc., New York (1972).
3. Gupta, V.B., and Kothari, V.K., Manufactured Fibre Technology, Chapman & Hall, 1997.

References:

1. Fourne, Franz, "Synthetic Fibres, Machines and Equipment, Manufacture, Properties", Hanser 1999.
2. Corbman, Bernard P, "Textiles fibre to fabric", Sixth Edition, McGraw Hill, 1983.