

(4 Lect./Week)
(4 hrs. Lab/Week)
(1 Student's presentation /Week)

(Total Credits -7)

Paper 701: Fiber Manufacturing Technology

1. **Introduction to manmade fibres:** Definition of made fibres. Brief history of manmade fibres. Relative merits and demerits of manmade fibres and natural fibres.
2. **Conversion of polymers into fibres:** Basic production systems of the man made fibre. Concept of melt spinning, dry spinning and dry jet wet spinning process. Factors influencing selection of a particular process for fibre formation. Relative merits and demerits of melt, dry and wet spinning processes. Effect of parameters on fibre breakage and fibre structure. Spinnability and factors affecting chain length. Variables of spinning. Different components of spinning process, i.e., extruder, gear pump, filters, manifold, spinning head, quenching chamber, winders. Quenching/Solidification techniques.
3. **Melt spinning:** Raw material, technology of polymerization and extrusion of polyester, nylon -6, nylon 66 and polypropylene. Effect of process parameters on structure and properties of melt spun filament. Characteristic features of PET, polyamide and polypropylene spinning.
4. **Solution dry spinning:** Dry spinning of cellulose acetate. Acetylation of cellulose. Dope preparation and spinning of cellulose diacetate and triacetate. Dry spinning of acrylic. Significance and types of comonomers used during polymerization of acrylic.
5. **Solution wet spinning:** Wet spinning of viscose rayon. Formation of structure in viscose and thermoplastic fibres. Influence of various additives and temperature of the regeneration bath and their influence on the process and properties of viscose rayon.
6. **Drawing and heat setting of fibres:** Introduction to drawing and heat setting in thermoplastic fibres. Concept of neck drawing. Effect of drawing conditions on the structure and properties of fiber. Effect of heat setting parameters on the structure and properties of fiber.

Practical - Polymer VII

1. Melt spinning of Nylon 6 and 66.
2. Solution spinning of Acrylic fiber.
3. Preparation of PP tape by extruders.
4. Heat setting of Fibers.
5. Thermal analysis of fibers.
6. Chemical modifications of fibers.

Suggested Readings:

1. Production of Synthetic Fibres by A A Vaidya, 1st Ed., Prentice Hall of India, New Delhi,(1988).
2. Manufactured Fibre Technology by V B Gupta and V K Kothari, 1st Ed., Chapman and Hall, London, (1997).
3. Synthetic Fibres by J. E. Macintyre, Wood Head Fiber Science Series, UK, (2003).
4. Textile Fibers: Developments and Innovations by V K Kothari, IAFL Publications, New Delhi (2000).