

## **PTX51101 YARN MANUFACTURING-III**

### **Course Objectives:**

- To educate the students about developments in design, constructional details and working principles of Ring spinning machine and their influence on techno-economic aspects of yarn.
- To educate the students on non-conventional spinning process and features of related machineries used for conversion of fibres to yarns and structure and properties of those yarns.
- To impart knowledge on spinning processes and related machineries for producing yarn from long staple fibres.

### **Course Outcomes**

**After successful completion of this course, the students should be able to**

- Describe the developments in Ring spinning machines to produce yarn of desired quality economically.
- Learn to use alternative non-conventional spinning process and machines involved in formation of yarn.
- Control process parameters in new spinning system to produce yarn.
- Compare the structure and properties of rotor spun, friction spun and air-jet spun yarns with ring spun yarn
- Select and control the process parameters to produce yarn from different long staple fibres such as wool, jute, flax and silk
- Calculate the production as well as draft of all the spinning systems

### **Module - I**

**Development in Ring Spinning : Compact Spinning** - working principles of different compact spinning systems-Elitwist-Comfortwin, structure and properties of compact yarns, applications of compact yarn - Techno economics of compact spinning. **SIRO Spinning**- Principle and mechanism of SIRO spinning system, structure, properties and end uses of SIRO yarn. Solo spinning system.

### **Module - II**

**Non-conventional spinning processes:** Causes leading to the advent of non-conventional systems of spinning.

**Rotor spinning :** Tasks of the rotor spinning machine; Mechanism of yarn formation on rotor spinning; Raw material requirements and preparation - raw materials requirements ( fibre lengths, fineness, strength, dirt & dust, foreign matter); Designing features of chief organs and their functions - sliver infeed unit - feeding roller & guide plate, opening unit - opening roller - clothing of the opening roller, trash removal, fibre guide passage, fibre flow into the Rotor - rotor groove, rotor diameter, combination of rotor diameter and rotor groove, rotor bearing, rotor revolutions, formation of a coherent fibre strand, back doubling, formation of the yarn, the false twist effect, wrapping fibers, yarn withdrawal and winding unit - navel- types of the navel, withdrawal tube, direction of withdrawal, package formation unit - requirements for the package, the winding process; Effect of rotor machine variables and fibre properties on the properties of rotor spun yarns. techno-economic aspects of rotor spinning system; Limitation of rotor spinning.

**Module – III**

**Friction spinning** : Operating principle; Designing aspects of feed device, opening roller and spinning drum, classification, raw material requirements, technological interrelationships, yarn structure and characteristics, techno-economic aspect.

**Air-jet spinning**: Mechanism of yarn formation on Air-jet spinning; Designing aspects of nozzles; Raw material requirements; Structure, properties and end uses of yarns spun on Air-jet spinning, techno-economics aspects.

Comparison of properties of ring spun, rotor spun, friction spun and air-jet spun yarn.

**Module – IV**

Long Staple Spinning:

Principle ,working and process parameters of spinning system for long staple fibres and their blends - such as woollen , worsted, spun silk , flax and jute spinning system.

**Books Recommended:**

1. Mahendra Gowda R V, “ New Spinning Systems”, NCUTE Publication, IIT Delhi, 2006.
2. Eric, Oxtoby, "Spun Yarn Technology", Butterworths, London, 1988.
3. Klein.W, “ New Spinning Systems: Vol 5”, The Textile Institute”, UK, 1993.
4. PR Lord “Spinning in 70’s”.

TENTATIVE  
Likely to be Modified