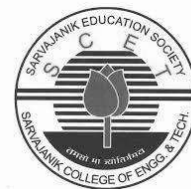




SARVAJANIK UNIVERSITY
Sarvajnik College of Engineering and
Technology
Bachelor of Engineering



B E IIIrd Year Textile Technology: Semester – V

Subject Name: Yarn Manufacturing - III

Subject Code: BTTT13501

Type of course: Professional Core Course

Prerequisite (if any): Textile Material, Yarn Manufacturing-I, Yarn Manufacturing-II

List of Courses where this course will be prerequisite: Process & Quality Control in Spinning & Weaving, Yarn Structure & Fabric Geometry, Textile Mill Management

Rationale: (should also include Description of the relevance of this course in the Program)

Yarns produced by the ring spinning method currently account for about 85% of all staple yarns produced.

It is, therefore by far the most popular method. Subject covers Ring spinning technology and development in it including Compact Spinning. It also include Doubling, Twisting and Fancy yarn manufacturing.

Teaching and Examination Scheme:

| TEACHING SCHEME | | | | Theory Marks | | | Practical Marks | | Total |
|-----------------|---|---|---|--------------|-----|-----|-----------------|-----|-------|
| L | T | P | C | TEE | CA1 | CA2 | TEP | CA3 | |
| 3 | 0 | 2 | 4 | 60 | 25 | 15 | 30 | 20 | 150 |

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests CA2: Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems TEE: Term End Examination TEP: Term End Practical Exam (Performance and viva on practical skills learned in course) CA3: Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

116

BSC: basic science course /ESC: Engineering Science Course /HSM: Humanities and management /PCC: Professional Core course /PEC: professional Elective course /OEC: Open Elective course/ MD: mandatory non-credit course

w.e.f. AY 2022-23



SARVAJANIK UNIVERSITY
Sarvajnik College of Engineering and
Technology
Bachelor of Engineering



Content:

| Sr. No. | Content | Total Hrs |
|---------|---|-----------|
| 1 | DRAFTING, TWISTING & WINDING Introduction, Basic operations: Drafting, Twisting, Traveller Lag, Origin, Propagation, Direction of twist, Importance & affect, T.M, Effect of T.M on yarn strength for two different staples, Structure of the cop, Winds: Warp wind (roving built), Reverse warp wind (cop built), Filling wind, Combination wind | 3 |
| 2 | SPINNING GEOMETRY Concepts, Spinning triangle: Significance of spinning triangle, Techniques developed to eliminate spinning triangle, Compact spinning, Comforspin by Rieter, Elite spinning system by Suessen, Aircom Tex 700 by Zinser, Lakshmi ROCOS, Perspectives, The inclination of the drafting arrangement, Roller overhang, Spinning angle, Angle of yarn passage into traveler, The balloon height, Other dimensions | 3 |
| 3 | THE PHYSICS OF SPINNING BALLOON The formation of spinning balloon, Balloon theory, Tension in the yarn: winding angle, winding on diameter, Air drag, Coriolis force, Balloon height, Methods of controlling tension variation | 3 |
| 4 | THE MACHINE DRIVE The drive problem, Motors used, The motor, Pole-changing three-phase motors, The A.S.S. drive, Three-phase shunt motor (commutator motor), DC shunt motor, The builder motion: The winding process, The builder motion, Building the base | 2 |
| 5 | DRAFTING SYSTEM Influence on quality & economics, The top rollers: Classification, Top roller covering, Ordering top roller cots, Top roller weighting, Fibre guiding devices: Linear guidance, Surface guidance (two dimensional), Volume guidance, Double apron drafting system with long bottom apron, Regular drafting system, Draft Calculations | 4 |
| 6 | DEVELOPMENTS IN DRAFTING AT RING FRAME Casablanca drafting: Drawbacks, Top arm drafting, Advantages of top arm, Second generation of top arm, Latest top arms, HP drafting (Suessen), Top rollers: Cots, Step | 3 |



SARVAJANIK UNIVERSITY
Sarvajnik College of Engineering and
Technology
Bachelor of Engineering



| | | |
|-----------|---|----------|
| | nose bar, Modified cradle for short staple cottons, Offset drafting by INA, Ring can spinning, Compact spinning | |
| 7 | RING SPINDLE The spindle assembly: Blade, Pulley or Wharve, Spindle, Bolster, Spindle Base, Influence of the spindle on the spinning process | 2 |
| 8 | SPINNING & DOUBLING SPINDLE DRIVE SYSTEMS Tape drive: Single spindle drives, Group drives - 4-spindle tape drive, Comparison between 4-spindle tape drive and single spindle drive, Spindle tapes, Elgitex – grooved spindle tape (inspired from formula –1 car racing), Tangential belt drive, Disadvantages compared with 4-spindle tape drive, Individual Motor driven spindle, Advantages, Sectional drive, main advantages, Contact Roll Assemblies, Tension Pulleys | 2 |
| 9 | MODERN SPINDLES Minimization of Spindle Bearing Forces, Various constructional possibilities guarantee the bearing flexibility : Simple flexible spindle bearings, Double elastic spindle bearing units, Spheropoint V/s conventional cone point, Minimization of Spindle Vibrations, Minimization of Power Consumption, latest range of spindles, Minimization of Running Noise, High Spindle Speeds, Centering Precision Between Spindle And Ring | 2 |
| 10 | SPINNING & DOUBLING RING TECHNOLOGY Introduction, The function of the spinning ring, The form of the ring: a. In Flange: Single Flange rings, Reversible Ring, Non-Reversible Ring; b. In Profile: Symmetrical rings, Asymmetrical rings; Ring size, Ring life, Ring manufacture, Raw material selection, Machining, Hardening, Finishing – various ring treatments, High speed ring : The Antiwedge Ring: The conventional ring and C – shaped traveller system limitations, The advantages of the ‘Antiwedge’ ring and the elliptical type traveler; The Orbit Ring, SU rings | 4 |
| 11 | RING TRAVELLERS Traveller, Functions, Designation of the traveller parts : Traveller arch or bow, Traveller count, Traveller mass, Traveller selection, Traveller life, Traveller profile, The form of the traveler, The material of the traveler, The traveller cleaner, Rolling traveller (Super traveller) | 4 |

BSC: basic science course /ESC: Engineering Science Course /HSM: Humanities and management /PCC: Professional Core course /PEC: professional Elective course /OEC: Open Elective course/ MD: mandatory non-credit course



SARVAJANIK UNIVERSITY
Sarvajnik College of Engineering and
Technology
Bachelor of Engineering



| | | |
|-----------|--|-----------|
| 12 | AUTOMATION The need to automate, The possibilities for automation, End break aspirator, Piecing devices, Roving stop motion, Travelling cleaner, Monitoring, ISM – Individual Spindle Monitoring, Optimizing output and quality, Zellweger RINGDATA, Flexible logistics, SERVODisc – Efficient cop transport, Automatic cop transport, ROBOLoad – Reliable automation | 3 |
| 13 | DOFFING Doffing, Preparation for doff, Manual doffing, Component parts of the installation, Preparation for doffing, The doff, Donning tubes, Completion of the doff, SERVOGrip –Trouble – free doffing: Decisive advantages of SERVOGrip, DOFFlock – Safely in small spaces, ROBODoff – the Rieter doffing system, The Zinser CoWeMat | 2 |
| 14 | Doubling: Objectives of doubled or folded yarn, Study on conventional ring doubling machine, Direction of twist used in to produce double or ply yarn a) S on Z or Z on S, b) Z on Z or S on S list of its yarn products. Two for one Twister: Principle of TFO, Passage of yarn, Special features of TFO, Advantages over ring doubling. | 4 |
| 15 | Fancy yarn: Definition of fancy yarn, Different varieties of fancy yarn, Use of fancy yarn, Principles of manufacturing Fancy yarns, Grandrelle yarn, Mock grandrelle or Marl yarn, Spiral yarn, Gimp yarn, Corkscrew yarn, Curl or loop yarn, Snarl yarn, Knop yarn, Cloud yarn, Slub yarn, Knickerbocker yarn, Nub yarn, Spot yarn, Flake yarn, Chenille yarn. Production of Fancy yarn: Knop yarn, Loop yarn, Snarl yarn, Spiral yarn, Stripe yarn, Slub yarn and Gimp yarn. | 4 |
| | | 45 |

Suggested Specification table with Marks (Theory):

| Distribution of Theory Marks | | | | | |
|-------------------------------------|-----------|-----------|----------|----------|----------|
| R Level | U Level | A Level | N Level | E Level | C Level |
| 20 | 15 | 10 | 5 | 5 | 5 |

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom’s Taxonomy)

BSC: basic science course /ESC: Engineering Science Course /HSM: Humanities and management /PCC: Professional Core course /PEC: professional Elective course /OEC: Open Elective course/ MD: mandatory non-credit course



SARVAJANIK UNIVERSITY
Sarvajnik College of Engineering and
Technology
Bachelor of Engineering



Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

| Sr no | Title of book /article | Author(s) | Publisher and details like ISBN | Year of publication | Publication Edition |
|-------|--|--------------------------------------|---------------------------------|---------------------|---------------------|
| 1 | Developments In Textile Production Technology And Medical Textiles | Jitendra R. Ajmeri & Chitra N. Joshi | Mahajan Publishers Pvt. Ltd. | 2010 | |
| 2 | A Practical Guide to Ring Spinning | W.Klein | | | Vol . IV |
| 3 | Two for one Twister technology and Technique for spun yarns | H. S. Kulkarni and HVS Murthy. | | | |
| 4. | Fundamental of Spun Yarn Technology | C. A. Lawrence | CRC Press. | | |

Course Outcomes:

| Sr. No. | CO statement | Marks weightage % |
|---------|--|-------------------|
| CO-1 | Describe the Ring frame, doubling, fancy yarn and compact spinning process. | 30 |
| CO-2 | Compare different type of ring and traveler, ring spinning and compact spinning. | 25 |

120

BSC: basic science course /ESC: Engineering Science Course /HSM: Humanities and management /PCC: Professional Core course /PEC: professional Elective course /OEC: Open Elective course/ MD: mandatory non-credit course



SARVAJANIK UNIVERSITY
Sarvajnik College of Engineering and
Technology
Bachelor of Engineering



| | | |
|------|--|----|
| CO-3 | Express the fundamentals of drawing, twisting and package building process and of doubling and fancy yarn manufacturing. | 30 |
| CO-4 | Calculate the production and efficiency of machine | 5 |
| CO-5 | State the latest development in ring frame | 10 |

Mapping with POs:

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O1 | PS O2 | PS O3 |
|------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|
| CO-1 | 2 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO-2 | 2 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO-3 | 2 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO-4 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 | 2 | 2 |
| CO-5 | 2 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| Rationale* | | | | | | | | | | | | | | | |

Rationale*: Explaining why it is matching this particular program outcome

Knowledge of Conventional Ring Spinning process and Doubling frame and fancy yarn manufacturing fulfils the PO's.

List of Open learning website:

List of Open Source Software: : <https://nptel.ac.in>

BSC: basic science course /**ESC:** Engineering Science Course /**HSM:** Humanities and management /**PCC:** Professional Core course /**PEC:** professional Elective course /**OEC:** Open Elective course/ **MD:** mandatory non-credit course



SARVAJANIK UNIVERSITY
Sarvajnik College of Engineering and
Technology
Bachelor of Engineering



FOR LAB SESSIONS:

List of Experiments:

1. To study the passage of yarn through different parts of ring spinning machine.
2. To study the drafting, twisting and winding zone in ring frame.
3. To study the building motion in ring frame.
4. Calculation of draft constants, twist constant, coils per inch and production of ring frame.
5. To ascertain the effect of break draft and total draft on yarn unevenness and strength (mill based study).
6. Estimation of spinning tension as a function of traveller weight, yarn count and balloon height (mill based study).
7. To perform various settings and maintenance operation on ring frame such as: a. Ring rail levelling b. Spindle gauging c. Spindle eccentricity d. Lappet eccentricity
8. To study the influence of spindle speed and traveller weight on hairiness.
9. Ring frame settings – Spindle gauging, lappet guide centering, spindle centering, etc.
10. Measurement of various parameters related to spinning geometry of different ring frames.
11. Study of Ring-doublers – passage, gearing, calculation related to twist, speed and production.
12. Study of TFO – passage, gearing, calculations related to twist, speed, production.
13. Manufacture of multi-twist and multi-count yarn.
14. Production of slub yarns and other fancy yarns by using Fancy yarn making device.

Major Equipment Needed: Ring frame, Ring Doubler, TFO

BSC: basic science course /ESC: Engineering Science Course /HSM: Humanities and management /PCC: Professional Core course /PEC: professional Elective course /OEC: Open Elective course/ MD: mandatory non-credit course