GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3142901
Semester – IV
Subject Name: Yarn Manufacture-II

Type of course: Professional Core Course

Prerequisite: Basic knowledge of fibres, ginning, blow room and carding process.

Rationale: Short staple spinning is highly applicable for majority of the situations. The attenuation, parallelization and reduction in diameter of material are important preparatory process to produce different count range for different variety of cotton fibre. There are two types of cotton spinning processes namely carded and combed within short staple spinning. Both have particular end use and application domain.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	4	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	**Draw Frame** Objectives; Design - Constructional features and working principles of draw frame; Top roller characteristics and maintenance – Processing of cotton, manmade fibres and blends; Principles of roller drafting and doubling; drafting waves and control of fibres; roller slip and roller eccentricity; Evolution of drafting systems at draw frame; Developments in draw frame drafting; Auto-leveller in draw frame; Online quality monitoring and control; Causes and remedies; Latest developments	15
2	**Comber** Comber Requirements of the Card, Draw frame etc. with respect to combing; Preparation for combing/Comber lap preparation; Introduction and objects of combing process; History of comber development; Types of Application; Types of Comber; Passage of Material through Combing machine; Sequence of operations in a Comber; Important elements of Combing – Feed Roller, Nipper Assembly, Combing cylinder, Top Comb etc.; Piecing, Take up of Web, Coiling the sliver, Waste Removal etc.; Parameters influencing the combing operation; Temperature and Humidity in Combing; The influence of machine components and settings on combing; Influence of the feed stock on combing; The noil theory of Gegauff; Common defects and their causes during the Combing process; control of Comber waste; Modern Developments; Calculations - % of comber noil, comber production etc.	15
3	**Speed Frame** Objectives; Concept of drafting, twisting and winding process; working principles of speed	12

	frame: Creel – drafting system – top and bottom rollers – top arm drafting system – roller settings – roller weighting systems; types of flyers and spindles; bobbin rail and spindle rail; drive to different parts of machine; spindle lead and bobbin lead; Study of mechanisms like – differential motion, swing motion, building mechanism, semi-automatic and automatic doffing, etc; Latest developments.	

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	**30**	**20**	**20**	**5**	**5**

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

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:

1. P. R. Lord, Handbook of Yarn Production, Technology, Science and Economics, CRC Press publication, New York, 2002.
2. Carl A. Lawrence, Fundamentals of Spun Yarn Technology, CRC Press publication, New York.
3. R. Chattopadhyay and R. S. Rengasamy, Spinning, Drawing, Combing & Roving, NCUTE Pilot, Programme, Indian Institute of Technology, New Delhi, 2003.
4. R. Chattopadhyay, Advances in Technology of Yarn Production, NCUTE, IIT Delhi, 2002.
5. W. Klein, Vol. 1 – 3, The Technology of Short Staple Spinning, A Practical Guide to Combing, Drawing and Roving frame, The Textile Institute Manchester, U.K., 1998.
6. Essential calculations of practical cotton spinning by T. K. Pattabhiraman.
7. Salhotra K R, "Spinning of Man Made and Blends on Cotton System", The Textile Association of India, Mumbai, 1989.

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Understand basics of Drawing, Combing and roving formation processes of staple spun yarns.	35
CO-2	To understand the importance of the Drawing, combing and roving process	25
CO-3	Apply knowledge of cotton spinning process for a given variety cotton fiber to manufacture different count range.	15
CO-4	Implement the remedial measures for different quality related problems in sliver formation and roving formation processes.	15

CO-5	Calculate the production and efficiency of Draw frame, comber and speed frame machine.	10

List of Experiments:

1. To study passage on draw frame.
2. To study drive to different parts on draw frame.
3. Calculate RPM and surface speed of different parts on draw frame.
4. Calculation: Production, TPI of sliver.
5. Study of drafting system according to fibre variety
6. To study the passage of material on sliver lap former machine.
7. To study drive to different parts on machine.
8. To calculate RPM and surface speed of different parts on machine.
9. To study the passage of material on ribbon lap former machine.
10. To study drive to different parts on machine.
11. To calculate RPM and surface speed of different parts on machine.
12. To study the passage of material on comber.
13. To study drive to different parts on machine.
14. To calculate RPM and surface speed of different parts on machine.
15. To calculate draft and production on comber.
16. To study combing cycle.
17. To study different gauges for comber.
18. Study the important settings on comber.
19. To study the passage of material through speed frame.
20. To study flyer, flyer assembly and drafting system.
21. To study drive to different parts of machine.
22. To study the movement of bobbin rail.
23. To study differential motion.
24. To study builder motion.
25. Calculation of draft, TPI, and Production calculation.

Major Equipment: Draw frame, Sliver lap machine, Ribbon lap machine, Comber, Speed frame.

List of Open Source Software/learning website: https://nptel.ac.in, World Wide Web, Google Search Engine etc.