GUJARAT TECHNOLOGICAL UNIVERSITY

TEXTILE TECHNOLOGY (29)
YARN MANUFACTURING II
SUBJECT CODE: 2142901
B.E. SEMESTER IV

Type of course: Engineering

Prerequisite: Students should have knowledge of Yarn Manufacturing – I.

Rationale: Yarn Manufacturing II covers the basics of Sliver, Lap formation and Roving formation processes which are considered to be the most important preparatory processes for yarn formation.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		PA (V)		PA (I)	
					PA	ALA	ESE	OEP		
4	0	2	6	70	20	10	20	10	20	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment; OEP-Open Ended problem; AL-Active learning;

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	**Draw Frame** Objectives; Design - Constructional features and working principles of drawframe; 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 drawframe; Developments in drawframe drafting; Auto-leveller in drawframe; On-line quality monitoring and control; Causes and remedies; Latest developments.	15	31 %
2.	**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.	18	38 %
3.	**Speed Frame**	15	31 %

	Objectives; Concept of drafting, twisting and winding process; working principles of speed 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):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
15	23	22	5	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate 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. Peter 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. Drawing, Combing and roving and speed frame by Zoltan, S.Szaloky, The Institute of Textile Technology, Verginia.
8. Cotton Drawing and Roving by G.R.Merril.
9. Salhotra K R, "Spinning of Man Mades and Blends on Cotton System", The Textile Association of India, Mumbai, 1989.

Course Outcome:
After learning the course the students should be able to
1. Select the type of Preparatory processes for Combing process.
2. Set and produce the roving with the hank based on the subsequent processes.
3. Know the remedial measures to be taken for different quality related problems at different machines.
4. Calculate the production and efficiency of all the machines.

List of Practical:
1. To study objects of draw frame.
2. To study passage on draw frame.
3. To study drive to different parts on draw frame.
4. Calculate RPM and surface speed of different parts on draw frame.
5. Calculation: Production, TPI of sliver.
6. Study of drafting system according to fibre variety.

7. Comparison of features of TAIRO draw frame and Modern Draw frame.
8. Study of maintenance schedule of Draw frame.
9. Defects and remedies of draw frame sliver.
10. Study of norms of Draw frame sliver.
11. Performance and parameters for performance assessment.
12. To study the objects of sliver lap former.
13. To study the passage of material on sliver lap former machine.
14. To study drive to different parts on machine.
15. To calculate RPM and surface speed of different parts on machine.
16. To study the objects of ribbon lap former.
17. To study the passage of material on ribbon lap former machine.
18. To study drive to different parts on machine.
19. To calculate RPM and surface speed of different parts on machine.
20. To study the objects of comber.
21. To study the passage of material on comber.
22. To study drive to different parts on machine.
23. To calculate RPM and surface speed of different parts on machine.
24. To calculate draft and production on comber.
25. To study combing cycle.
26. To study different gauges for comber.
27. Study the important settings on comber.
28. To study the passage of material through speed frame.
29. To study flyer, flyer assembly and drafting system.
30. To study drive to different parts of machine.
31. To study the movement of bobbin rail.
32. To study differential motion.
33. To study builder motion.
34. Calculation of draft & Tpi.
35. Calculation of lay of roving.
36. Production calculation.

Open Ended Problems/Design Oriented Problems: Apart from above experiments a group of students has to undertake one open ended problem/design problem. Few examples of the same are given below.

1. Develop a drafting system of Draw Frame.
2. Develop a combing cylinder of Comber.
3. Develop a builder cam driving mechanism of Speed Frame.

Major Equipments:
Draw Frame
Speed Frame

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

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU