GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Textile Engineering

Subject Code : ME02025011

Subject Name : Theory of Yarn Formation

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	PCC

Prerequisite:	Basic knowledge of Theory of yarn manufacturing at BE level
Rationale:	Understanding of yarn manufacturing processes is required to enhance overall functioning of various spinning processes.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Understand basics of yarn manufacturing of spun yarns.	R,U
02	Analyse various processes involved in yarn manufacturing in greater depth.	U, A, N, E
03	Apply the yarn manufacturing knowledge for understanding behavior during and after spinning.	U, A, N, E
04	Establish relationship between manufacturing process and properties of yarn.	A, N, E, C
05	To be able to diagnose the causes of various process related problems and faults	A, N, E, C

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	1	0	4	70	30	0	0	100

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Forces on fibers during opening and cleaning process and its effect; Theories of carding, transient state of carding machine, analysis of cylinder load and transfer efficiency, average number of revolution of fiber on cylinder and fiber mixing in card; Fiber shedding from	12	25

	cylinder, effect of centrifugal force and air drag, role of wire geometry on fiber shedding, carding force between cylinder and flat and factors influencing it, hook formation in carding.		
2.	Analysis of fiber configuration in draw frame sliver; hook removal and its significance, Sliver irregularity, Fiber movement in drafting field; suppression of drafting wave, Drafting force, Roller slip, Roller eccentricity and vibration.	06	15
3.	Boundary length in forward and backward feed comber, fiber fraction in comber, action of top comb, wavelength of piecing wave, differential combing, effect of batt weight in combing, probabilistic model for calculation of comber noil and effective noil removal.	04	10
4.	Analysis of forces on yarn and traveler, Spinning tension in ring and rotor spinning, spinning geometry, Twist flow in ring and rotor spinning, Balloon theory in spinning; mechanism of end breaks in ring and rotor spinning; probability model of end breaks, roller lapping and its prevention, aprons and cots	06	15
5.	Yarn formation in rotor spinning, fiber flux, fiber overlap and gap of fiber layer in rotor groove, change in fiber orientation in rotor spinning, generation of wrapper fiber, property relation of rotor	07	15
6.	Friction spun yarns, fiber arrangement in friction spun yarns, principles of yarn formation, torque on yarn, composite yarn spinning in friction spinning; Airjet and vortex technologies, role of edge fibres, classification of rotor and air jet yarn; development in compact spun yarns.	10	20
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20	**25**	**35**	**10**	**10**	**0**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Yarn Production: Theoretical aspects, P Grosberg & C Iype, The Textile Institute International, Manchester, 1999
2. The economics, Science and Technology of Yarn Production, P.R. Lord, School of Textiles, NC State of University, USA, 1981.
3. Advances in Yarn Spinning Technology – C.A. Lawrence.
4. Technology of carding by R. Chattopadhyay (NCUTE).
5. Advances in technology of yarn production by R. Chattopadhyay (NCUTE).
6. Handbook of Yarn Production – Peter R. Lord.
7. Open end spinning by R. Nield, Textile Institute monograph series, 1975.
8. The principle and theory of ring spinning, A. E. De Barr, and H. Catling, Manual of cotton spinning Vol. 5, The Textile Institute, Manchester 1965.
9. Journals: Textile Research Journal, Princeton, USA and Journal of Textile Institute, Manchester, UK.

(b) Open source software and website:

1. http://nptel.iitm.ac.in, World Wide Web, Google Search Engine etc.

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