



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Master

Branch: Textile Engineering

Course / Subject Code : ME01025011

Course / Subject Name : Structural Mechanics of Yarn

w. e. f. Academic Year:	2024-25
Semester:	1 st Semester
Category of the Course:	PCC

Prerequisite:	Theory of structure at BE level.
Rationale:	Understanding of yarn structure is required to enhance overall functioning of textile processes.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	Understand basics of structure and geometry for both spun and filament yarns.
02	Apply the yarn structure knowledge for understanding behavior during and after spinning
03	Establish relationships between structure and properties of yarn.

**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
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA/CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150



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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Types of yarn. Structural parameters of yarn. Role of yarn structure on yarn and fabric properties.	8	10%
2.	Yarn diameter and density. Elements of yarn geometry. Geometry of helix and its application to yarn structure. Twisting forms and yarn contraction.	12	25%
3.	Theoretical analysis of effect of fiber properties and their geometrical configuration on the tensile properties of yarn. Theories and analysis of yarn strength and irregularity. Breakage of continuous filament and spun yarns.	12	30%
4.	Fiber migration characteristics of continuous filament and spun yarns.	8	25%
5.	Structure and property relationship of ring, compact, rotor, air-jet and friction spun yarns.	5	10%
	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
10	20	20	20	20	10

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. Hearle J W S, Grosberg P and Backer S, "Structural Mechanics of Fibres, Yarns and Fabrics", Wiley Interscience, New York, 1969.
2. Goswami B C Martindale J G and Scardino F, "Textured Yarn Technology, Structure and Applications", Wiley Interscience Publisher, New York, 1995.



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3. Hearle J W S, Thwaites J J and Amirbayat J, “Mechanics of Flexible Fibre Assemblies”, S.and N. International Publishers BV, Netherlands, 1980.
4. W. Zurek, “The structure of yarn”, US Department of Agriculture and the National Science Foundation, Washington, D. C., Warsaw, Poland, 1975.
5. Journals: Textile Research Journal, Princeton, USA and Journal of Textile Institute, Manchester, UK.

(b) Open source software and website:

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

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