GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: TEXTILE ENGINEERING

SUBJECT NAME: THEORY OF YARN STRUCTURE

SUBJECT CODE: 3712508

M.E. 1st SEMESTER

Type of course : Core (I)

Prerequisite : Theory of structure at BE level

Rationale : Understanding of yarn structure is required to enhance overall functioning of textile processes.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE(E)	PA (M)	PA (V)	PA (I)	
3	1	0	4	70	30	0	0	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Types of yarn. Structural parameters of yarn. Role of yarn structure on yarn and fabric properties.	**7**	10
2	Yarn diameter and density. Elements of yarn geometry. Geometry of helix and its application to yarn structure. Twisting forms and yarn contraction.	**11**	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, rotor, air-jet and friction spun yarns.	**4**	10

Reference 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.
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.

Course Outcome:

After learning the course the students should be able to:

1. Understand basics of structure and geometry for both spun and filament yarns.
2. Apply the yarn structure knowledge for understanding behavior during and after spinning.
3. Establish relationship between structure and properties of yarn.

Open End Problems

1. Analyze various techniques (Classical and modern) of measuring yarn diameter and density.
2. What are the latest developments on understanding structural aspects of spun yarns made from other than Ring Spinning?
3. Establish relations between structure and properties of spun and filament yarns.

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