GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Post Graduate

Branch: Textile Engineering

Course / Subject Code : ME01025021

Course / Subject Name : Fabric Manufacturing for Technical Textiles

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

Prerequisite:	Basic knowledge of fabric manufacturing methods like weaving, knitting and nonwoven at BE level
Rationale:	Understanding of advanced methods of manufacturing fabric with newer application areas. The knowledge will help in identifying highly innovative areas of technical textile for latest fabrics.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	Understand the principles and operations of various technical textiles fabric manufacturing systems.
02	Apply knowledge to develop various products for technical applications.
03	Improve knowledge of manufacturing process of nonconventional fabrics for technical application.

**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	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Fabric manufacturing systems, Shuttleless weaving systems for Technical Textiles, Yarn Preparation for Highspeed weaving, Preparation of high-performance fibres/tows for weaving, weaving of glass and carbon fabric	4	10
2.	Introduction of 3D fabric, definition and its classification, manufacturing and structure of orthogonal and angle interlock 3D woven fabric, Multilayer weaving, Multiaxial weaving, Properties and applications of fabrics produced in these systems.	6	14
3.	Introduction and classification of braids, diamond, regular, and Hercules structure; Braiding machines, Horn gears; biaxial and triaxial braids, 3D braiding, Structure, properties and applications of braided fabrics	6	14
4.	Principles of fabric manufacturing on multiphase, circular, narrow looms and Leno Weaving	8	20
5.	Weft and warp knitted structures for technical applications; 3D warp knitted fabric - Spacer weaving etc.	7	14
6.	Developments in nonwoven technologies, Stitch bonding methods, Nonwoven composite fabrics, 3D nonwovens.	7	14
7.	Introduction, definition, types of nanomaterials, 1D, 2D and 3D nanomaterials, Nanotechnology in textiles, nanofibres, electrospinning, Nano finishing, Nanocomposites	7	14
	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. Advances in Modern Woven Fabrics Technology by Savvas Vassiliadis, InTech, 2011
2. Textile Technology, by Burkhard Wulfhorst, Thomas Gries and Dieter Veit, HANSER Publication, 2012

3. Handbook of weaving, by Sabit Adanur,Technomic Publication, 2003
4. Handbook of Nonwoven, by S J Russel, Woodhead Publication, 2007
5. Advances in Knitting Technology by K F Au, Woodhead Publication, 2009
6. Braiding and Braiding Machinery (1964), by W.A. Douglass, Centrex Publishing Company.
7. Introduction to Nanoscience and Nanotechnology by C. P. Poole, Jr and F. J. Owens,
8. Wiley India -Student Edition(2006)
9. Nanotechnology: A New Route to High Performance Textiles, Textile Progress by M. Joshi and A. Bhattacharya, (2011)

(b) Open source software and website:

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

Suggested Course Practical List: If any

1. Study latest development in various shuttleless weaving machines.
2. Study the working principle of 3D woven fabric.
3. Study the working principle of 2D and 3D braiding.
4. Study the working principle of multiphase weaving.
5. Study of fabric manufacturing in circular weaving loom.
6. Study of fabric manufacturing in a narrow loom
7. Study the working principle of leno weaving.
8. Study the working principle of Spacer fabric weaving.
9. Study the working principle of Nonwoven composite fabric.
10. Study the working principle of Electrospinning.

List of Laboratory/Learning Resources Required:

Air jet loom, Rigid Rapier loom for Heavy fabrics, Projectile loom, Water jet loom, 3D fabric manufacturing, Double Pile Latch machine for Spacer fabric, CCI Loom, Braiding machine, Electrospinning, SMS nonwoven loom – Lab model, Characterization lab for Advanced Fabric, etc.

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