



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Textile Manufacturing Technology

Subject Code : DI04029081

Subject Name : Non Woven Technology

w. e. f. Academic Year:	2025-26
Semester:	4 th
Category of the Course:	Professional Elective - II

Prerequisite:	General knowledge of Textile Technology and Fibers is required for this course.
Rationale:	This course provides a comprehensive overview of nonwovens, including their definition, structure, and creation. It covers staple-fibre-based processes such as fiber preparation and web formation. The curriculum further delves into various web bonding processes, including mechanical, thermal, and chemical methods. Additionally, it explores polymer-extrusion-based technologies like Spun bond and Melt blown processes, and concludes with an examination of both mechanical and chemical finishing processes for nonwovens

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Explain the definition, classification, and structure of nonwoven fabrics.	R,U,A
02	Describe staple-fiber based web formation processes.	R,U,A
03	Differentiate between various web bonding methods.	R,U,A,N
04	Explain polymer extrusion-based technologies.	R,U,A,N
05	Discuss finishing techniques and evaluate the performance of nonwoven fabrics.	R,U,A,N

**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(M)	PA(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.	1.1 Definition and classification of nonwovens. 1.2 Structure, appearance and geometry of fibrous webs. 1.3 Overview of nonwoven processes and their sequences.	9	20%
2.	2.1 Fiber preparation: raw materials, opening and mixing. 2.2 Web formation: carding 2.3 Different Lay Process a) parallel-lay b) cross-lay c) perpendicular-lay d) air-lay e) wet-lay processes	11	24%
3.	3.1 Different bonding process 3.2 Mechanical bonding a) Needle-punching b) Hydroentanglement. 3.3 Thermal bonding a) Callender bonding b) Through-air bonding c) Infrared d) Ultrasonic bonding 3.4 Chemical bonding 3.5 Types of binders 3.6 Binder application methods a) saturation, foam b) spray c) print bonding.	11	24%
4.	4.1 Polymer-Extrusion Based Technologies 4.2 Spun bond technology a) Raw materials b) process flow c) equipment d) parameters. 4.3 Melt blown technology a) Raw materials b) process flow c) machine design	7	16%



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	d) control factors.		
5.	5.1 Finishing Processes 5.2 Mechanical finishes: Process and methods. 5.3 Chemical finishes: Finishes and application techniques	7	16%
	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
23	38	24	16		

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. S. J. Russell (Ed.), *Handbook of Nonwovens*, Woodhead Publishing, CRC Press, 2007. ISBN-10: - 1855736039 ISBN-13: - 9781855736030
1. W. Albrecht, H. Fuchs, W. Kettelmann, *Nonwoven Fabrics: Raw Materials, Manufacture, Applications*, Wiley-VCH, 2003. ISBN-10: -3527304061 ISBN-13: -9783527304066
2. M. S. Casper, *Nonwoven Textiles*, Noyes Data Corp, 1975. ISBN-10: -0815505612 ISBN-13: -9780815505617
3. Tomasino, C., *Chemistry & Technology of Fabric Preparation & Finishing* (1992): Publisher: North Carolina State University ISBN-10:- 0000021857 ISBN-13:- 9780000021854
4. Purdy, A.T. (1980). Needle-punching. ISBN-10: -0900739320 ISBN-13: -9780900739323
5. Dharmachakra, R.K. et al. (1995). Thermal Bonding of Nonwoven Fabrics. The Textile
6. Institute, Manchester ISBN-10:-1870812786 ISBN-13:-9781870812788

(b) Open source software and website:

1. www.nonwovens.com
2. www.edana.org
3. www.inda.org



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Suggested Course Practical List:

1. Study of raw materials used in nonwoven production (fibers and polymers)
2. Demonstration of fiber opening and blending processes.
3. Web formation using carding machine.
4. Web formation using air-lay and cross-lay methods.
5. Study and operation of needle-punching machine
6. Demonstration of hydroentanglement process.
7. Study of thermal bonding (calendar and through-air).
8. Study of chemical bonding processes (saturation and spray bonding).
9. Demonstration of Spun bond process.
10. Demonstration of melt blown process
11. Comparative Analysis of Spun bond and Melt blown Fabrics
12. Study of Mechanical finishing techniques for nonwoven fabrics
13. Study of chemical finishing techniques for nonwoven fabrics
14. Comparative analysis of woven, knitted, and nonwoven fabrics.

List of Laboratory/Learning Resources Required:

Suggested Project List:

1. Collection of Biodegradable Composite Nonwoven for Agricultural Mulch:
2. Study of Sound-Absorbing Nonwoven Panel:
3. Study of Hydroentanglement Process for Technical Textiles:
4. Different type of Chemical Binder used in textile industry
5. Comparative Study of Spun bond vs. Needle-Punched Fabrics for Geotextiles:
6. Analysis of Thermal Bonding vs. Chemical Bonding for Hygiene Products:

Suggested Activities for Students:

1. Nonwoven Sample Library Creation
2. Collect different video related to nonwoven
3. Collect nonwoven used in routine life

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