GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Textile Engineering

Subject Code : ME02025051

Subject Name : Non Woven

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

Prerequisite:	Basic knowledge of technical textiles at BE level.
Rationale:	Applications of nonwoven is on ever increasing trend recently. The technology for manufacture of nonwovens is also developing at a very fast rate. Advanced knowledge of nonwoven manufacturing is very important to apply them in diverse industrial applications.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Become familiar with advanced fundamentals of nonwoven production process.	R,U
02	Apply the basic concepts to design and translate the design into prototype / product and also to analyze and interpret data related to nonwoven structures, manufacturing and quality analysis.	U,A,E
03	Understand the testing and applications of nonwoven fabrics made from them.	R,U
04	Understand the characterization of nonwoven fabrics.	R,U
05	Understand importance advanced application areas of nonwoven fabrics.	R,U

**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.	Introduction, Definition, Classification and areas of application of nonwoven fabrics. Different methods of production of nonwoven	6	14

	fabrics. Effect of machines, fibre and process variables on propertiesof nonwoven fabrics. Failure mechanism of nonwoven fabrics.		
2.	Web preparation by dry and wet method, bonding by mechanical, thermal and chemical methods; brief outline of nonwoven manufacture by spun bonding and melt blown processes	6	14
3.	Characterisation, testing and modelling of nonwoven fabrics: international standards, structure of nonwovens, and properties of nonwovens	10	24
4.	Scientific analysis of structure and properties of nonwovens: fibres and their arrangement, pores and their organization, mechanics of nonwovens, fluid flow and fluid absorption, filtration, barrier and breathability, thermal insulation, and acoustic absorption	11	24
5.	Engineering of advanced nonwoven products: medical nonwovens, nonwoven wipes, nonwoven filters, automotive nonwovens, and home furnishing nonwovens, etc.	12	24
	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**
25	**30**	**20**	**15**	**5**	**5**

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. Russell S., "Hand Book of Nonwovens", Textile Institute, Manchester, 2004,
2. Kellie, G. (Ed.). (2016). Advances in technical nonwovens. Woodhead Publishing.
3. Lunenschloss J., Albrecht W. and David Sharp., "Nonwoven Bonded Fabrics", Ellis Horwood Ltd., New York, 1985
4. Mrstina V. and Feigl F., "Needle Punching Textile Technology", Elsevier, New York, 1990
5. Jirsak O. and Wadsworth L. C., "Nonwoven Textiles", Textile Institute, Manchester, 1999
6. Dharmadhikary R. K., Gilmore T. F., Davis H. A. and Batra S. K., "Thermal Bonding of Nonwoven Fabrics", Textile Progress, Vol.26, No.2, Textile Institute Manchester, 1995
7. Chapman R., "Applications of Nonwovens in Technical Textiles", Textile Institute, Manchester, 2010

8. AbhijitMajumdar, Apurba Das, R.Alagirusamy and V.K.Kothari., "Process Control in Textile Manufacturing", Wood Head Publishing Limited, Oxford, 2013
9. Journals: Textile Research Journal, Princeton, USA and Journal of Textile Institute, Manchester, UK.

(b) Open source software and website:

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

Suggested Course Practical List:

1. Dry laid web formation
2. Wet laid web formation
3. Polymer laid web formation
4. Mechanical bonding
5. Thermal Bonding
6. Chemical bonding
7. Fabric weight, thickness, density and other structural parameters
8. Measuring porosity, pore size and pore size distribution
9. Measuring Tensile properties of nonwoven fabrics
10. Measuring water vapour transmission and gas & liquid permeability.

List of Laboratory/Learning Resources Required:

Nonwoven web making machines, Nonwoven production line – needle punch, meltblown, spunbond, spunlace, spunmelt line, fabric thickness tester, density and weight measuring testers, tensile tester, porosity tester, air permeability tester etc.

Suggested Project List:

1. Analyze various ways web formation techniques for non wovens.
2. Analyze various ways of bonding technology for making non woven fabrics.
3. What are the recent applications of non woven fabrics?

Suggested Activities for Students:

1. Collection and identification of various type of nonwoven fabric.
2. Visit to any nonwoven industry.

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