

GUJARAT TECHNOLOGICAL UNIVERSITY

TEXTILE ENGINEERING (25)

NONWOVENS

SUBJECT CODE: 2722510

SEMESTER: II

Type of course: Elective

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.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks		Practical Marks				
			ESE (E)	PA (M)	ESE (V)		PA (I)			
		ESE			OEP	PA	RP			
3	2#	2	5	70	30	20	10	10	10	150

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	Introduction to nonwovens, Materials used in nonwovens, Principles of nonwoven processes: web formation processes, bonding processes, spunmelt processes, and chemical processes	10	25
2	Characterisation, testing and modelling of nonwoven fabrics: international standards, structure of nonwovens, and properties of nonwovens	10	25
3	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,	10	25
4	Engineering of advanced nonwoven products: medical nonwovens, nonwoven wipes, nonwoven filters, automotive nonwovens, and home furnishing nonwovens, etc.	10	25

Reference Books:

1. Adanur, S. "Handbook of Weaving", CRC Press, 2001
2. Russel S.J. "Handbook of Nonwoven", The Textile Institute, 2007
3. Albrecht W., Fuchs H. and Kittlemann W. "Nonwoven Fabrics", Wiley- VCH, 2003
4. Horrocks A.R. and Anand S.C., "Handbook of Technical Textiles", The Textile Institute, 2000
5. Chapman, R.A., "Applications of Nonwovens in Technical Textiles", The Textile Institute, 2010.
6. Tanchis, G., "The Nonwovens", ACIMIT, 2008
7. Adanur, S., "Industrial Textiles"
8. 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. Become familiar with advanced fundamentals of nonwoven production process.
2. 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.
3. Understand the testing and applications of nonwoven fabrics made from them.
4. Understand the characterization of nonwoven fabrics.
5. Understand importance advanced application areas of nonwoven fabrics.

List of Experiments:

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.

Open End Problems

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?

Major Equipments: Nonwoven web making machines, Needle punching and other nonwoven bonding machines. Fabric thickness, density and weight measuring testers, Tensile, porosity, permeability etc testers.

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

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.