



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Textile Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
M.Tech. in Textile Chemistry (76 Credit _2023-2025)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MTTC201	DCC	ADVANCES IN DYEING	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit.

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. Demonstrate theory of dyeing.
2. To teach different dyeing application.
3. To demonstrate the various methods of dyeing
4. Demonstrate various theories and concepts relation to dyeing processes of textile materials.
5. To determine different fastness properties

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes. The students will be able to

1. Understand various principles, objectives and properties of dyeing processes in textile wet processing.
2. Understand the preparation of dyed fabric sample and methods of dyeing effectively.
3. Conduct independently fibre and yarn dyeing.
4. Attempt batchwise, semi-continuous and continuous dyeing
5. Analyze fastness properties and various problems associated with dyeing processes of textile material.

Syllabus

UNIT I: Theory of Dyeing

9 hours

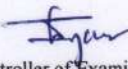
Introduction and objectives of dyeing, Properties of Dyes, Colour and Chemical Constitution: Chromophore, auxochrome and solubilising group, Colour measurement, Solubility of dyes, Substantivity and reactivity, Transport of dye to fiber surface, Dye adsorption on the fiber surface, Diffusion of dye, fixation of dye.

UNIT II: Classification of Dyes

10 hours


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Type of dyes: Classification of dyes according to chemical constitution and according to application; Properties, mechanism and application of Basic/Cationic dyes, Direct dyes, Reactive dyes, Vat dyes, Sulphur dyes, Acid dyes, Metal Complex dyes, Disperse dyes, Pigments; Commercial names of dyes, Tests for identification of dyes.

UNIT III: Fiber and Yarn Dyeing

8 hours

Fiber dyeing: Loose Stock Dyeing, Top dyeing, Gel dyeing, Tow dyeing, Dope dyeing, Flock dyeing; Yarn dyeing: Package dyeing, Hank dyeing, Space dyeing, Denim Dyeing.

UNIT IV: Fabric Dyeing

9 hours

Batchwise, Semicontinuous and continuous dyeing methods, Soft flow dyeing, Pad-Batch method, Pad-Dry method, Pad-steam method, Thermosol dyeing method, Pad-Dry-Pad-Steam process, pad-dry- thermofix process.

Unit V: Fastness requirements

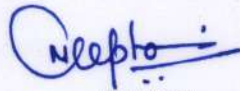
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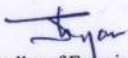
Washing Fastness, Light fastness, Rubbing Fastness, Perspiration fastness, Fastness to laundering, Fastness to bleaching agent, Fastness to dry heat; Xenotest, Launder-o-meter, Crock-meter, Blue wool standard, Grey scale, Staining scale.

References:

1. Technology of Dyeing, V.A. Shenai, Sevak Publications, Wadala Mumbai, 1996.
2. Cellulosic Dyeing, John Shore, Bradford: Society of Dyers and Colourists, 1995.
3. Dyeing and Chemical Technology of Textile Fibre - Trotman, E.R., Charles Griffin and Co. Ltd., London. 1991.
4. Textile Preparation and Dyeing: Asim Kumar Roy Choudhury, Society of Dyers and Colourists, 2011
5. Textile Dyeing: Mahapatra, N.N., Woodhead Publishing India in Textiles, New Delhi, 2018.


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MTTC202	DCC	ADVANCES IN PRINTING AND FINISHING	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit.

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. Demonstrate various principles and mechanisms of printing processes on textile goods.
2. Build analyzing capability of various problems associated with finishing processes of textile material
3. Demonstrate various theories and concepts relation to printing and finishing processes of textile materials
4. Illustrate the various principles, mechanism of finishing process on textile materials.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes. The students will be able to

1. The student will be able to understand principles, methods and styles of printing.
2. The student will be able to identify various chemicals and ingredients used for printing.
3. The student will be able to understand the printing process on digital textile printing machine
4. The students will get exposure on mechanical finishing of textile materials.
5. The student will be able to understand different textile chemical finishing.

Syllabus

UNIT I: Printing methods and styles

9 Hours

Introduction and objectives of printing, Different traditional methods of printing: Block printing, Manual Screen Printing, Automatic Flat Bed screen printing, Rotary Screen printing, Transfer printing, Digital printing; Different styles of printing: Direct, discharge and resist style.

UNIT II: Printing ingredients

9 Hours

Dyes: Direct dye, Reactive dye, vat dye, azoic dye, acid dye, metal complex dye, basic dye, disperse dye; pigments: Different types of pigments, Role of Catalyst and Crosslinking agents; Thickeners: Starch, Gum, Sodium alginate, Emulsion thickener; Printing paste rheology, thixotropic behaviour; Auxiliaries in printing paste; Pretreatment and after treatment processes

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UNIT III: Digital Textile Printing

10 Hours

Introduction, Advantages, Difference between analog and digital printing, Spot colour and process colour, Essential steps in digital printing, ink jet printing process, Pre and post treatment needed, Principle of ink jet technology- Continuous Ink Jet: Binary Process, Pulsating System, Drop on Demand: Drop formation, Drop Control; CYMK Colour, Quality of image, Types of Digital printing machine, Printing inks: Rheology, Water based inks.

UNIT IV: Mechanical Finishing of textile materials

8 Hours

Introduction and objectives of finishing, Mechanical finishing: Calendering, Embossing, Raising, Seuding, Napping, Pitch finish, Shearing, Sanforisation, drying: Multicylinder drying, Hot air drying, Festoon drying, Palmer drying.

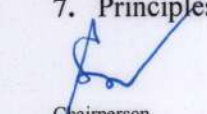
Unit V: Chemical finishing of textile materials

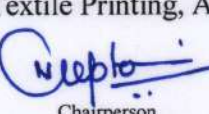
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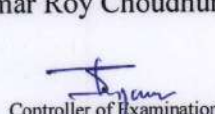
Chemical finishing: Crease resistant finishing, Finishing with softeners, Silicone finish, Water proof and water repellent finish, Flame retardant finish, antimicrobial finish, soil release finish, application of nanotechnology in finishing, application of plasma in finishing.

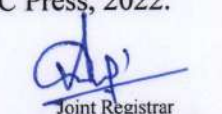
References:

1. Technology of Printing, V A Shenai, N M Saraf, Sevak Publications, Bombay, 1987.
2. Technology of Finishing, V A Shenai, N M Saraf, Sevak Publications, Bombay, 1987.
3. Textile Printing, Leslie W.C. Miles, Society of Dyers and Colourists, UK, 2003.
4. Chemical finishing of Textiles, W.D. Schindler, P.J. Hauser, Woodhead Publishing, 2004.
5. Principles of Textile Finishing, Asim Kumar Roy Choudhury, ELSEVIER, 2017.
6. Advances in Functional Finishing of Textiles, Mohammad Shahid (Editor), Ravindra Adivarekar (Editor), Springer, 2020.
7. Principles of Textile Printing, Asim Kumar Roy Choudhury, CRC Press, 2022.


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MTTC203	DCC	COATING AND LAMINATION	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit.

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. Demonstrate various principles and mechanisms of coating and lamination on textile goods.
2. Build analyzing capability of various problems associated with coating and lamination of textile material
3. Illustrate the general principles of fabric coating.
4. Demonstrate various theories and concepts relation to coating and lamination.
5. Describe different testing and product evaluation techniques.

Course Outcomes (COs):

After completion of this course the students are expected to be able to acquire following knowledge, skills, and attitudes. The students will be able to

1. Understand commercial and technical scope of coating and lamination of textile materials
2. Evaluate the prerequisites for coating and lamination of textiles.
3. Understand principle of production of coated and laminated textile materials.
4. Evaluate various products of coated and laminated fabrics.
5. Understand quality assurance and test conditions of coated and laminated textile materials.

Syllabus

UNIT I: Introduction to coating and lamination

9 hours

Introduction, Definitions, Fabric coating, Fabric finishing, Fabric lamination, Composite materials, Commercial scope of coated and laminated textiles, technical scopes of coated and laminated textiles

UNIT II: Prerequisites for coating and lamination

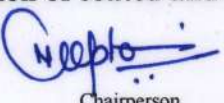
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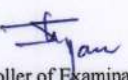
Fabrics, Preparation of fabric for coating and lamination, materials required for coating and lamination, Compounding of polymers (Resins), Adhesives, Flame retardancy

UNIT III: Production of coated and laminated fabrics

9 Hours


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M.Tech. in Textile Chemistry (70 Credit 2023-2025)											
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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MTTC203	DCC	COATING AND LAMINATION	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit.

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

General principles of fabric coating, direct coating, foam finishing, transfer coating, coagulated polyurethane coating, Back licking roller techniques, Hot melt extrusion coating, Calender coating, Rotary screen coating, Fabric impregnation, Lamination, Flame lamination, Hot melt lamination, Discussion of the various methods

UNIT IV: Products from coated and laminated fabrics

9 hours

Sports and industrial protective clothing, Industrial and functional products, Automotive applications, Marine applications, Building and architectures, Household products, Medical uses, Military uses, Other materials involving coating and lamination

UNIT V: Testing and product evaluation

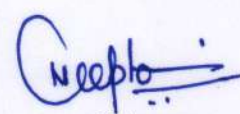
9 hours

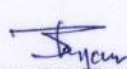
Quality assurance, General test conditions, Testing of coated fabrics, Thermal comfort of apparels, Testing of automotive products, Flammability testing, Specialist testing for chemical and biological hazards, Investigation of faulty material and customer complaints

References:

1. Chemical finishing of Textiles by W.D. Schindler, P.J. Hauser (Editors), Woodhead Publishing Ltd, 2004.
2. Textile Coating and Laminating by William C. Smith, Technomic Publication Company, 1998.
3. Handbook of Technical Textiles by A R Horrocks and S C Anand (Editors), Woodhead publishing Ltd, 2000.
4. Coated and Laminated Textiles by Walter Fung, Woodhead publishing Ltd, 2002.
5. Coating and Laminating of Textile Fabrics by Senthil Kumar, Createspace Independent Publications, 2014.


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MTTC214	DSE	ADVANCES IN MANUFACTURED FIBRE	60	20	20	0	0	3	0	0	3

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. Demonstrate the different fiber spinning systems.
2. Describe the significance of production techniques and properties of new fibers.
3. Illustrate the new developments in specialty fiber.
4. Demonstrate about new profile fibers and their characteristics.
5. Describe about importance of bio-component fibers.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes. The students will be able to

1. Get the knowledge of construction and applications of high-performance fibers.
2. Understand the production techniques and properties of aromatic polyamides fibres.
3. Apply knowledge to solve problems occurred at the time of manufacturing of fibres.
4. Understand the fundamentals of hollow and bicomponent fibres.
5. Apply their knowledge in development of new fibre product.

Syllabus

Unit I: Different Fibre Spinning Systems

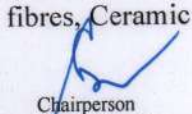
9 hours

General definition of manmade or manufactured fibres, melt spinning, dry spinning, wet spinning, solution spinning and gel spinning. Extruder design, spin head, spinneret, quench chamber. Spin finish application, wind up mechanism.

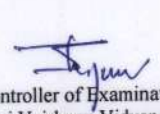
Unit II: Production Techniques and Properties of New Fibres

9 hours

Production techniques and properties of aromatic polyamides & polyesters, Rigid rod and ladder polymers such as Kevlar, Nomex, BBL, PBZT, PBO, PBI, Manufacturing of carbon fibres from PAN precursors, viscose and pitch fibres, Liquid crystal fibres, High performance polyethylene fibres, Ceramic fibres.


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M. Tech. in Textile Chemistry (6 Credit 2020-2021)											
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MTTC214	DSE	ADVANCES IN MANUFACTURED FIBRE	60	20	20	0	0	3	0	0	3

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Unit III: Specialty Fibre

9 hours

Introduction to new developments. Other fibres including PU, PVA, PE, PVC and polyvinylidene chloride. Primary and secondary variables and their effect on melt spinning. High speed spinning, spinning of microfibre.

Unit IV: Profile Fibres

9 hours

Profile fibres, hollow & porous fibres, spandex fibres; Biodegradable fibres, polylactic acid fibres, chitosan fibres, their preparation properties and applications.

Unit V: Bicomponent Fibre

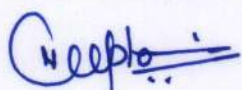
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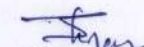
Bicomponent fibres, blended fibres; Fibres in medicine and biotechnology; Aesthetic fibres, bio-mimicking fibres; Membranes; Smart fibres; Comfort fibres; Fibres for Ballistic protection; Photochromatic fibres.

References:

1. The Chemistry of Textile Fibres, Mather, R. R., Wardman, R. H., Royal Society of Chemistry, 2015.
2. Production of Synthetic Fibres – Vaidya, A. A., Prentice Hall of India, Private Limited, New Delhi, 1998.
3. Manmade Fibers – Moncrief, R.W., Halstead Press, New York, 1975. Fourné F, "Synthetic Fibres: Machines and Equipment, Manufacture, Properties", Hanser Publisher, Munich, 1999.
4. Gupta V B and Kothari V K, "Manufactured Fibre Technology", 1st Ed., Chapman and Hall, London, 1997
5. Handbook of Textile Fibre Structure, Eichhorn, S., Hearle, J. W.S., Kikutani, T., Jaffe. M., ELSEVIER, Vol. 1, 2009.
6. Macintyre J E, "Synthetic Fibres", Woodhead Fibre Science Series, UK, 2003.


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MTTC224	DSE	Enzyme Technology for Textile Processing	60	20	20	0	0	3	0	0	3

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Course Educational Objectives (CEOs):

- 1 To demonstrate about nomenclature, classification and characteristics features of enzymes.
2. To illustrate the kinetics of single-substrate enzyme.
3. To impart knowledge on enzymes for pretreatment on Textile substrates.
4. To demonstrate about treatment of effluents with enzymes.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes. The students will be able to

1. Student will be able to understand nomenclature, classification and characteristics of enzymes.
2. Students will be able to interpret kinetics of single-substrate enzyme.
3. Students will be able to understand the application of enzyme on cotton fiber.
4. Students will be able to comprehend the application of enzyme on protein fibers.
5. Students will be able to understand enzyme technology and biological remediation.

Syllabus

UNIT I: Introduction

9 hours

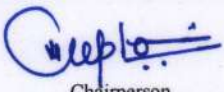
Textile industry and sustainable textile processing. Importance of enzyme in textile processing. Nomenclature and classification of enzymes; characteristic features of enzymes; modifiers of enzyme activity - activators and inhibitors; specificity of enzyme action; extraction and purifications of enzymes.

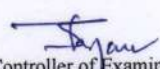
UNIT II: Enzyme Kinetics

9 hours

Various reactions involved in enzyme catalysed processes. Basic principles of interaction between enzyme and substrate. Kinetics of single-substrate enzyme- catalysed reactions; Basics of kinetics of multi-substrate enzyme-catalysed reactions.


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Shri Vaishnav Institute of Textile Technology Choice Based Credit System (CBCS) in Light of NEP-2020 M.Tech. in Textile Chemistry (76 Credit 2023-2025)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MTTC224	DSE	Enzyme Technology for Textile Processing	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit.

*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT III: Enzymes for Cotton Fibre

9 hours

Chemistry and structure of cotton fibre; Pretreatment processes on cotton substrates – Enzymatic desizing, enzymatic scouring and bleaching. Enzyme used in finishing of cotton fabric: bio polishing. Use of amylase, lipase, Oxido-reductase, cellulase etc. Advantages and limitations of enzymatic processes on cotton and other cellulosic fibers.

UNIT IV: Enzymes for Protein and synthetic fibers

9 hours

Chemistry and structure of protein fibers such as wool and silk. Enzymes for processing and functionalizing protein fibres; Enzymatic degumming. enzymatic modification of polyester, polyamide, polyacrylonitrile and cellulose acetate fibres. Advantages and limitations of enzymatic processes on protein and synthetic fibers.

Unit V: Enzymes in Effluent Treatment

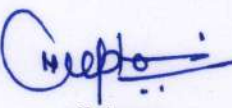
9 hours

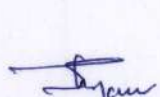
Water pollution and textile industry. Importance of effluent treatment in textile industry. Process flow of effluent treatment in textile chemical processing plant. Enzyme technology and biological remediation, Enzyme decolourization, decolourization by biosorption and enrichment cultures.

References:

1. Freifelder D., "Molecular Biology ", Jones and Bartlett Publishers Inc. 1987.
2. Nierstrasz V. and Cavaco-Paulo A., "Advances in textile biotechnology", Woodhead Publishing Ltd, Cambridge, UK, 2010.
3. Cavaco-Paulo A. and Gubitz G., "Textile processing with enzymes", Woodhead Publishing Ltd, Cambridge, UK, 2003.
4. Technology of Finishing, V A Shenai, N M Saraf, Sevak Publications, Bombay, 1987.


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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MTTC234	DSE	NONWOVEN SCIENCE AND ENGINEERING	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit.

*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. The students will be able to get the basic knowledge about the principle of manufacturing of non woven materials.
2. The students will be able to get the basic knowledge about the applications of non woven materials to the extent of their technical use.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate the following knowledge, skills, and attitudes. The students will be able to

1. To Understand the material used and properties of non-woven fabrics.
2. To know basic knowledge about the various bonding agents used in non-woven process.
3. To know basic knowledge about the principles of non-woven process.
4. To understand basic knowledge about the various bonding process of non-woven fabrics.
5. Illustrate basic knowledge about the various finishing process of non-woven fabric.

Syllabus

UNIT I: Introduction to nonwovens

9 hours

Introduction to nonwovens, Materials used in nonwovens, fiber description considerations, properties of nonwoven fabric produced using different fibrous matter.

UNIT II: Principles of nonwoven processes:

9 hours

Web formation processes. Types of webs and their forming techniques, staple fibre web – dry-laid web and wet laid web, continuous fibre web – spun laid web and melt blown web.

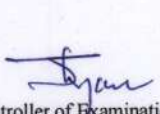
UNIT III: Bonding of nonwovens:

10 hours

Mechanical and Thermal bonding processes, needle punch, spun bond and spun lace processes, hydro entanglement, and chemical bonding processes etc.


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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT IV: Bonding agent in nonwovens

9 hours

Bonding agent used in nonwovens; properties desired in bonding agent. Classification and areas of application of nonwoven fabrics, General production steps for nonwoven fabric manufacturing. Dry bonded fabric production steps; spun bonded fabric production steps, wet bonded fabric production steps.

Unit V: Finishing of nonwovens:

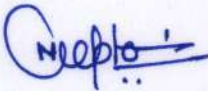
8 hours

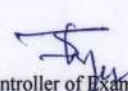
Finishing of nonwoven fabrics – calendaring and pressing, water repellent finish, antistatic finish, antimicrobial finish, flame retardant finish and soil release finish.

References:

1. Handbook of Non-wovens by Stephen Russell, Woodhead Publishing Ltd., UK, 2007
2. Albrecht W, Fuchs H & Kittelmann, "Nonwoven Fabrics", Wiley-VCH Weinheim, 2003.
3. Gulrajani M L, "Book of Papers of International Conference on Nonwovens", The TextileInstitute, UK, 1992
4. Mrstina V & Fejgal F, "Needle punching textile technology", Elsevier, 1990.
5. Spencer D J, "Knitting Technology", 2nd Ed., Pergamon Press, 1989.
6. Lunenschloss J and Albrecht W, "Non-Woven Bonded Fabric", Ellis and Horwood Ltd., UK, 1985.
7. Krcma Radco, "Manual of nonwovens", Textile Trade Press, UK, 1971.


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