

**Program Name** : Diploma in Textile Technology  
**Program Code** : TC  
**Semester** : Fifth  
**Course Title** : Finishing of Synthetic Fibres  
**Course Code** : 22577

### 1. RATIONALE

In textile industry, various processes such as dyeing, printing, and finishing are used to manufacture quality textile. Beside to natural fabric, synthetic fabric and their blends are used commonly in textile manufacturing. Finishing is an important process to increase the market value of synthetic fabric and their blends. The knowledge and skills related to the chemical processing of synthetic fibres to develop relevant finishing effect is essential for the diploma engineers to create quality textile. This course is developed in such a way that basic concepts and principles of finishing of synthetic fabric, their blends and application methods will help the diploma engineer to get quality finished synthetic fabrics. This will further help them to solve broad based problems in the textile finishing processes.

### 2. COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Undertake finishing processes for synthetic textile materials and their blends for end use.

### 3. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

- Use relevant finishing method for dimensional stability of synthetic fabric and their blends.
- Use relevant anti-pilling method for synthetic fabric and their blends.
- Use relevant soil release finish for synthetic fabric and their blends.
- Use relevant minimum application technique for textile fabric.
- Apply relevant finishing formulation for textile fabric.
- Use special finish for textile fabric.

### 4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit (L+T+P)	Examination Scheme												
L	T	P		Theory						Practical						
				Paper Hrs.	ESE		PA		Total		ESE		PA		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
3	-	4	7	3	70	28	30*	00	100	40	25@	10	25	10	50	20

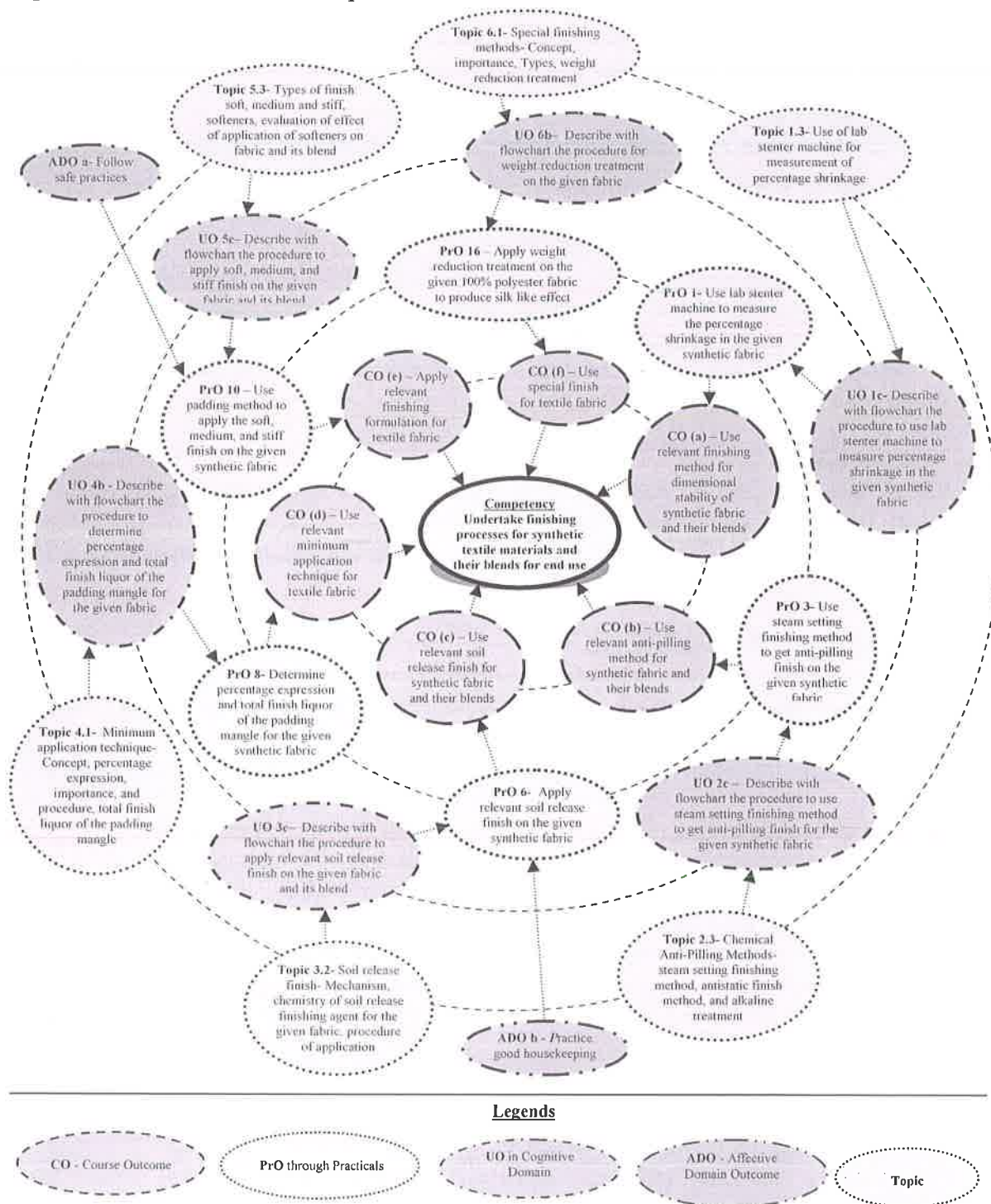
(\*): Under the theory PA, Out of 30 marks, 10 marks are for micro-project assessment to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessment of the cognitive domain UOs required for the attainment of the COs.

**Legends:** L-Lecture; T- Tutorial/Teacher Guided Theory Practice; P - Practical; C - Credit  
 ESE - End Semester Examination; PA - Progressive Assessment



**5. COURSE MAP (with sample COs, PrOs, UOs, ADOs and topics)**

This course map illustrates an overview of the flow and linkages of the topics at various levels of outcomes (details in subsequent sections) to be attained by the student by the end of the course, in all domains of learning in terms of the industry/ employer identified competency depicted at the centre of this map.



**Legends**



**Figure 1 - Course Map**

**6. SUGGESTED PRACTICALS/ EXERCISES**

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:



S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1	Use lab stenter machine to measure the percentage shrinkage in the given synthetic fabric.	I	02*
2	Use lab stenter machine to measure the percentage shrinkage in the given synthetic blends.	I	02*
3	Use steam setting finishing method to get anti-pilling finish on the given synthetic fabric.	II	02
4	Apply antistatic finish on the given synthetic fabric.	II	02*
5	Use pilling tester to determine the pilling tendency of the given synthetic fabric.	II	02*
6	Apply relevant soil release finish on the given synthetic fabric.	III	02*
7	Apply relevant soil release finish on the given synthetic blend.	III	02
8	Determine percentage expression and total finish liquor of the padding mangle for the given synthetic fabric.	IV	02
9	Use padding method to apply blue tone and red tone on the given fabric.	IV	02*
10	Use padding method to apply the soft, medium, and stiff finish on the given synthetic fabric.	V	02*
11	Use padding method to apply the soft, medium, and stiff finish on the given synthetic blend.	V	02
12	Use relevant finishing formulation for the given synthetic fabric.	V	02
13	Use padding method to apply the soft, medium, and stiff finish on the given carbonized fabric.	V	02*
14	Use relevant finishing formulation for the given polyester blends.	V	02*
15	Apply relevant softener to evaluate its effect on the given synthetic fabric and their blends.	V	02*
16	Apply weight reduction treatment on the given 100% polyester fabric to produce silk like effect.	VI	02*
17	Use lab padding mangle to get relevant special finish on the given textile.	VI	02*
18	Use lab padding mangle to get water proof and water repellent finish on the given textile.	VI	02
<b>Total</b>			<b>36</b>

**Note**

- i. A suggestive list of PrOs is given in the above table. More such PrOs can be added to attain the COs and competency. A judicious mix of minimum 12 or more practical need to be performed, out of which, the practicals marked as "\*" are compulsory, so that the student reaches the 'Precision Level' of Dave's 'Psychomotor Domain Taxonomy' as generally required by the industry.
- ii. The 'Process' and 'Product' related skills associated with each PrO is to be assessed according to a suggested sample given below:

Sr. No.	Performance Indicators	Weightage in %
1.	Preparation of experimental set up	20
2.	Setting and operation	20
3.	Safety measures	10
4.	Observations and Recording	10





Sr. No.	Performance Indicators	Weightage in %
5.	Interpretation of result and Conclusion	20
6.	Answer to sample questions	10
7.	Submission of report in time	10
<b>Total</b>		<b>100</b>

The above PrOs also comprise of the following social skills/ attitudes which are Affective Domain Outcomes (ADOs) that are best developed through the laboratory/field based experiences:

- a) Follow safety practices.
- b) Practice good housekeeping.
- c) Practice energy conservation.
- d) Work as a leader/a team member..
- e) Follow ethical Practices.

The ADOs are not specific to any one PrO, but are embedded in many PrOs. Hence, the acquisition of the ADOs takes place gradually in the student when s/he undertakes a series of practical experiences over a period of time. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- 'Valuing Level' in 1<sup>st</sup> year
- 'Organisation Level' in 2<sup>nd</sup> year
- 'Characterisation Level' in 3<sup>rd</sup> year.

#### 7. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will be useful in uniformity in conduct of experiments, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	Laboratory Padding Mangle Machine- two bowl vertical or horizontal machine with safety measures. Automatic or manual machine, able to perform piece finishing on fabric sample.	4,6-15,17,18
2	Lab Curing Chamber-Temperature 0 to 220 degree Celsius, able to cure lab sample, continuous machine	1,2,4,6,7,9-15, 17
3	Dryer- Temperature range 0 to 100 degree Celsius, lab sample drying	3,4,6,7,9-18
4	Beakers (glass)-100 ml, 500ml, 1 liter, glass rod—20 cm in length	6-15
5	Weighing balance- 3 digit weighing balance	8-15
6	Water bath –capacity - 10 to 20 pots	6,7,12,15,16
7	Iron for ironing treated fabric samples, ironing table with cloth	1,2,6,7,12-18
8	Measuring Cylinder- capacity-10 ml, 100ml, 1000ml.	6,7,10-18

#### 8. UNDERPINNING THEORY COMPONENTS

The following topics are to be taught and assessed in order to develop the sample UOs given below for achieving the COs to attain the identified competency. More UOs could be added.



Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
<b>Unit- I Heat setting</b>	1a. Describe the effect of heat setting on the properties of the given fabric with justification. 1b. Describe with sketch heat setting stages and conditions for the given fabric sample. 1c. Describe with flowchart the procedure to use lab stenter machine to measure percentage shrinkage in the given synthetic fabric. 1d. Describe with flowchart the procedure to use lab stenter machine to measure percentage shrinkage in the given synthetic blends. 1e. Describe the procedure to calculate efficiency of heat setting by shrinkage method for the given synthetic fabric and their blends.	1.1 Heat setting- Importance, type and percentage shrinkage, heat setting stages, methods, conditions and mechanism for synthetic fibre and their blends. 1.2 Synthetic fibre- Thermal behavior, changes in properties due to heat setting 1.3 Use of lab stenter machine for measurement of percentage shrinkage. 1.4 Efficiency of heat setting-shrinkage method.
<b>Unit- II Anti-pilling finishing</b>	2a. Explain the importance of anti-pilling methods for the given fabric with justification. 2b. Select relevant anti-pilling finishing methods for the given fabric with justification. 2c. Describe with flowchart the procedure to use steam setting finishing method to get anti-pilling finish for the given synthetic fabric. 2d. Describe with flowchart the procedure to apply antistatic finish on the given synthetic fabric. 2e. Describe with flowchart the procedure to use pilling tester to determine the pilling tendency of the given synthetic fabric. 2f. Describe the relevant factors affecting the pilling property of the given fabric.	2.1 Pilling - Concept, pill formation causes and mechanism, effects on further processing, factors affecting pilling - Properties of fibre, yarn, and fabric. 2.2 Physical Anti-Pilling Methods- Singeing, heat setting. 2.3 Chemical Anti-Pilling Methods- steam setting finishing method, antistatic finish method, and alkaline treatment. 2.4 Evaluation- Pilling tester, Pilling tendency
<b>Unit-III Soil release finishing</b>	3a. Explain the importance of soil release finishing agent for the given fabric with justification. 3b. Describe the soiling mechanism of the given fabric. 3c. Describe the relevant factors affecting the soiling tendency of the given fabric. 3d. Describe the chemical formulation of soil release finishing agent for the given fabric. 3e. Describe with flowchart the	3.1 Soil- concept, type, and mechanism of soiling. 3.2 Soil release finish- Mechanism, chemistry of soil release finishing agent for the given fabric, procedure of application. 3.3 Factors affecting soiling tendency of the given fabric. 3.4 Evaluation-Soil release finish.



Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
	procedure to apply relevant soil release finish on the given fabric and its blend.	
<b>Unit –IV Foam finishing</b>	4a. Describe the effect of minimum application technique for the given fabric with justification. 4b. Describe with flowchart the procedure to determine percentage expression and total finish liquor of the padding mangle for the given fabric. 4c. Describe with flowchart the procedure to use padding method for application of blue tone and red tone on the given fabric. 4d. Describe with sketch the procedure to get optimum finish on the given fabric. 4e. Select relevant foam application method for the given synthetic fabric and its blend with justification.	4.1 Minimum application technique- Concept, percentage expression, importance, and procedure, total finish liquor of the padding mangle. 4.2 Foam- Definition, Properties, Blow ratio and foam stability, Advantages and limitations, factors affecting stability of foam. 4.3 Foam generation method- Static and dynamic 4.4 Foam application method
<b>Unit-V Recipe formulation</b>	5a. Calculate the chemicals required for finishing treatment on the given fabric. 5b. Describe with flowchart the procedure to get finishing formulation for the given fabric and its blend. 5c. Describe with flowchart the procedure to apply soft, medium, and stiff finish on the given fabric and its blend. 5d. Describe with flowchart the procedure to apply relevant softener to evaluate its effect on the given fabric and its blend.	5.1 Finishing treatment: chemicals required for the given fabric. 5.2 Finishing formulation: Selection of chemicals for synthetic fabric and their blends, calculation of volume, formulation for 100% synthetic fabric, and for synthetic blend. 5.3 Types of finish: soft, medium and stiff, softeners, evaluation of effect of application of softeners on fabric and its blend.
<b>Unit-VI Special finishes and development</b>	6a. Explain the importance of special finishing methods for the given fabric with justification. 6b. Describe with flowchart the procedure for weight reduction treatment on the given fabric. 6c. Describe with flowchart the procedure for carbonization treatment on the given fabric. 6d. Describe with flowchart the relevant procedure to get special finish on the given fabric. 6e. Apply new development in textile finishing on the given fabric.	6.1 Special finishing methods- Concept, importance, Types, weight reduction treatment 6.2 Polyester- Silk like finish, Carbonisation. 6.3 Wool finishing- Milling, decatizing, Rotary press, crabbing. 6.4 Nano technology- Concept, applications, advantages and limitations, 6.5 Emulsion- Concept, application in textile. 6.6 Microencapsulation- Concept,



Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
	6f. Describe with flowchart the procedure for waterproof and water repellent treatment on the given fabric.	Application 6.7 Waterproof and water repellent finish.

*Note: To attain the COs and competency, above listed UOs need to be undertaken to achieve the 'Application Level' and above of Bloom's 'Cognitive Domain Taxonomy'*

## 9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Heat setting	10	2	6	8	16
II	Anti-pilling finishing	06	2	2	4	08
III	Soil release finishing	08	2	4	6	12
IV	Foam Finishing	06	2	2	6	10
V	Recipe Formulation	06	2	2	4	08
VI	Special Finishes and development	12	2	6	8	16
<b>Total</b>		<b>48</b>	<b>12</b>	<b>22</b>	<b>36</b>	<b>70</b>

**Legends:** R=Remember, U=Understand, A=Apply and above (Bloom's Revised taxonomy)

**Note:** This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.

## 10. SUGGESTED STUDENT ACTIVITIES

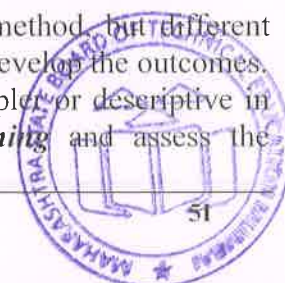
Other than the classroom and laboratory learning, following are the suggested student-related **co-curricular** activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Visit a local Industry. Collect the samples of various finishes. Write their application in day to day life.
- Collect the photographs of garment in which special finishes are used. Classify them and write a brief about each category.
- Visit local industry and prepare the process flow for various finished fabrics.
- Market survey for new development in finishing.
- Collect various unfinished and finished sample and compare them.

## 11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

- Massive open online courses (**MOOCs**) may be used to teach various topics/ sub topics.
- '**L**' in item No. 4 does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.
- About **15-20% of the topics/ sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the





development of the COs through classroom presentations (see implementation guideline for details).

- d) With respect to item No.10, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
- e) Guide student(s) in undertaking micro-projects.
- f) Demonstrate students thoroughly before they start doing the practice.
- g) Encourage students to refer different websites to have deeper understanding of the subject.
- h) Observe continuously and monitor the performance of students in Lab.

## 12. SUGGESTED MICRO-PROJECTS

**Only one micro-project** is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project is group-based. However, in the fifth and sixth semesters, it should be preferably be *individually* undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. The concerned faculty could add similar micro-projects:

- a) Visit a local Industry. List the chemicals used in finishing. Find out the information about the chemicals such as strength, manufacturing process, and role of chemical, market cost, etc. Present the report.
- b) Collect various finished synthetic fabric samples from different textile industries and prepare presentation describing their applications and manufacturing cost.
- c) Collect various finished synthetic fabric samples from different textile industries and identify the fault in finished sample. Write their causes and remedies. Present your report.
- d) Visit local laundries and collect fabric sample, photographs, and data about various stain removing agents used for different type of stains with their properties. Present report.
- e) Visit local industries, collect various soil release finishing agents used in the industry, and prepare presentation describing their properties.
- f) Collect samples from industry and prepare the comparative chart for finishing of natural and synthetic fabrics. Prepare presentation describing their properties.

## 13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Chemical processing of synthetic and its blends	Datya, K.V; Vaidya, A.A	A Wiley Inter Science Publication, New York, 1984 ISBN-9780471876540
2	Technology of finishing Vol. X	Shenai, V.A	Sevak Publication, Mumbai, India 1990
3	Introduction to textile finishing	Marsh, J.T.	Publisher: CHAPMAN & HALL, 1979 ISBN-2221114790087





S. No.	Title of Book	Author	Publication
4	Chemical after treatments of textiles	Marks, Atlas; Wooding	A Wiley inter science publication, New York, 1971 ISBN-9781563675164
5	Textile Finishing	Derek Heywood	SDC Publications, Hampshire, UK, 2003 ISBN-9780901950811
6	Chemical finishing of textile	Schindler, W. D.; Hauser, P. J.	Wood Head Publishing, New Delhi, 2004, ISBN- 185573 9054
7	A Practical Guide to Textile Testing	Amutha, K.	Wood Head Publishing, New Delhi, 2016. ISBN: 9789385059070

#### 14. SOFTWARE/LEARNING WEBSITES

- a) [nptel.ac.in/courses/116102010/36](http://nptel.ac.in/courses/116102010/36)
- b) [textilelearner.blogspot.in/2012/03/what-is-heat-setting-working-process-of.html](http://textilelearner.blogspot.in/2012/03/what-is-heat-setting-working-process-of.html)
- c) [textilelearner.blogspot.in/2011/03/description-of-textile-finishing\\_1796.html](http://textilelearner.blogspot.in/2011/03/description-of-textile-finishing_1796.html)
- d) [indiantextilejournal.com/articles/FAdetails.asp?id=3729](http://indiantextilejournal.com/articles/FAdetails.asp?id=3729)
- e) [www.textileglossary.com/terms/soil-release.html](http://www.textileglossary.com/terms/soil-release.html)
- f) [textilelearner.blogspot.in/2013/03/soil-release-finish-mechanism-of-soil.html](http://textilelearner.blogspot.in/2013/03/soil-release-finish-mechanism-of-soil.html)
- g) [www.suitestyles.com/what-is-soil-release-finish/](http://www.suitestyles.com/what-is-soil-release-finish/)
- h) [textileapex.blogspot.in/2015/05/what-is-foam-finishing-technology-advantages-disadvantages.html](http://textileapex.blogspot.in/2015/05/what-is-foam-finishing-technology-advantages-disadvantages.html)
- i) [www.tandfonline.com/doi/abs/10.1080/00405160308688960?journalCode=ttpr20](http://www.tandfonline.com/doi/abs/10.1080/00405160308688960?journalCode=ttpr20)
- j) [journals.sagepub.com/doi/abs/10.1177/004051757904900308?journalCode=trjc](http://journals.sagepub.com/doi/abs/10.1177/004051757904900308?journalCode=trjc)
- k) [journals.sagepub.com/doi/abs/10.1177/004051758205200607](http://journals.sagepub.com/doi/abs/10.1177/004051758205200607)
- l) [link.springer.com/article/10.1023%2FA%3A1023080221850](http://link.springer.com/article/10.1023%2FA%3A1023080221850)
- m) [ubir.bolton.ac.uk/120/](http://ubir.bolton.ac.uk/120/)
- n) [nopr.niscair.res.in/bitstream/123456789/19293/1/IJFTR%2021\(1\)%2079-89.pdf](http://nopr.niscair.res.in/bitstream/123456789/19293/1/IJFTR%2021(1)%2079-89.pdf)
- o) [wtjohnson.co.uk/finishing.php](http://wtjohnson.co.uk/finishing.php)
- p) [www.emeraldinsight.com/doi/abs/10.1108/RJTA-14-01-2010-B006](http://www.emeraldinsight.com/doi/abs/10.1108/RJTA-14-01-2010-B006)
- q) [www.fsrj.org/act/7\\_nenkai/16-7-ISFR/symposium%20abstract/Contributory %20talks/CT%2019\\_Dudnyk%20et%20al.pdf](http://www.fsrj.org/act/7_nenkai/16-7-ISFR/symposium%20abstract/Contributory%20talks/CT%2019_Dudnyk%20et%20al.pdf)

