

**Program Name : Diploma in Fashion and Clothing Technology**  
**Program Code : DC**  
**Semester : Fourth**  
**Course Title : Technology of Pre-treatment and Colouration**  
**Course Code : 22470**

### 1. RATIONALE

Garmenting is the process in which fabric is converted in to garment. This fabric undergoes several chemical processes. Some chemical treatment is also carried out on garment additionally to increase the value of garment. Some garments possess their functional properties because of certain kind of chemical processing only. Hence the basic information of chemical processing is essential for student. Student should apply the knowledge of chemical processing to develop requisite properties in garment.

### 2. COMPETENCY

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

- Use relevant chemical processing methods for required fabric properties.

### 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 mechanical/chemical pre-treatment to remove the faults from grey fabrics
- Use relevant dyes and chemicals for colouration of natural fibres.
- Use relevant dyes and chemicals for colouration of synthetic fibres.
- Use relevant printing method for printing of fabric/garments.
- Use novel printing effects for garments.

### 4. TEACHING AND EXAMINATION SCHEME

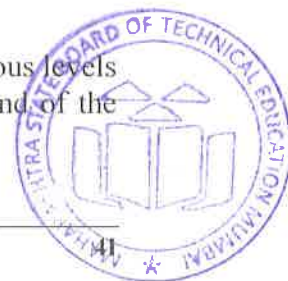
Teaching Scheme			Credit (L+T+P)	Examination Scheme												
L	T	P		Theory						Practical						
				Paper Hrs.	ESE		PA		Total		ESE		PA		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
3	-	4	7	3	70	28	30*	00	100	40	50@	20	50	20	100	40

(\*): 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.

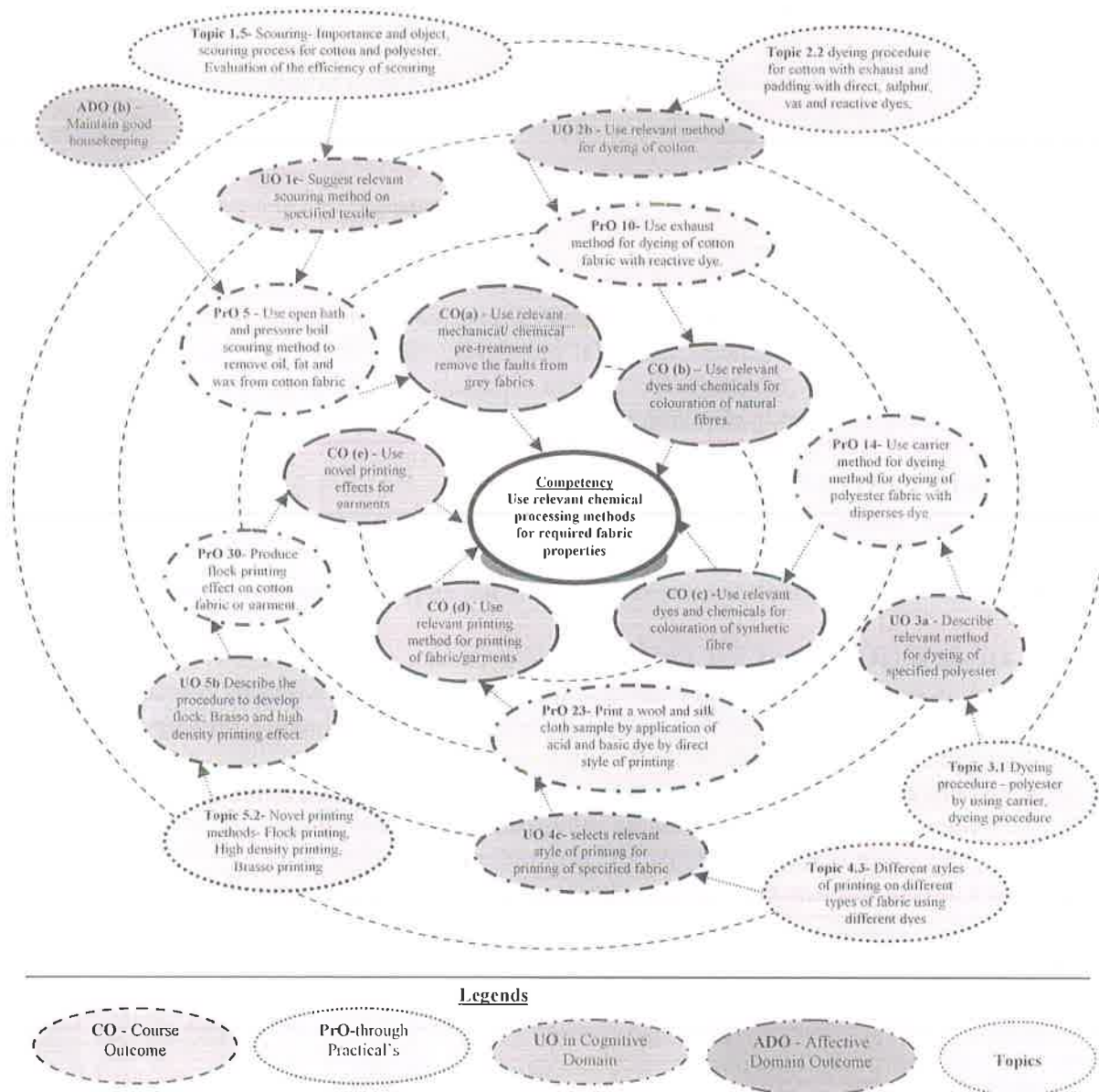


Figure 1 - Course Map

6. SUGGESTED PRACTICALS/ EXERCISES

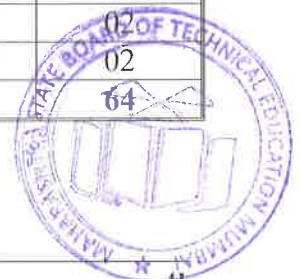
The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1.	Use chemical method to identify natural textile fibre.	I	02*
2.	Use chemical method to identify synthetic textile fibre.	I	02
3.	Use acid desizing method to remove size on textile.	I	02*
4.	Use enzyme desizing method to remove size on textile.	I	02
5.	Use open bath and pressure boil scouring method to remove oil, fat and wax from cotton fabric(part 1)	I	



Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
6.	Use open bath and pressure boil scouring method to remove oil, fat and wax from cotton fabric(part 2)*	I	02*
7.	Use hypochlorite and hydrogen peroxide bleaching method to improve whiteness of cotton fabric(part 1)	I	02
8.	Use hypochlorite and hydrogen peroxide bleaching method to improve whiteness of cotton fabric( part 2)*	I	02*
9.	Use exhaust method for dyeing of cotton fabric with direct dye.	II	02
10.	Use exhaust method for dyeing of cotton fabric with reactive dye.(part 1)	II	02
11.	Use exhaust method for dyeing of cotton fabric with reactive dye (part 2)*	II	02*
12.	Use exhaust method for dyeing of cotton fabric with vat/ sulphur dye.(part 1)	II	02
13.	Use exhaust method for dyeing of cotton fabric with vat/ sulphur dye. (part2)*	II	02*
14.	Use carrier method for dyeing method for dyeing of polyester fabric with disperses dye.	III	02
15.	Use HTHP method for dyeing method for dyeing of polyester fabric with disperses dye.	III	02
16.	Produce tie and dye effect on cotton fabric.	IV	02*
17.	Produce batik effect on cotton fabric.	IV	02
18.	Produce block printing effect on cotton fabric.	IV	02*
19.	Produce stencil printing effect on cotton fabric.	IV	02
20.	Print a cotton cloth sample by application of dye by direct style of printing.(part 1)	IV	02*
21.	Print a cotton cloth sample by application of dye by direct style of printing.(part 2)	IV	02
22.	Print a wool and silk cloth sample by application of acid and basic dye by direct style of printing.(part 1)	IV	02
23.	Print a wool and silk cloth sample by application of acid and basic dye by direct style of printing.(part 2)*	IV	02*
24.	Print a polyester cloth sample by application of disperse dye by direct style of printing.(part 1)	IV	02
25.	Print a polyester cloth sample by application of disperse dye by direct style of printing.(part 2)*	IV	02*
26.	Develop white discharge effects on cotton using direct and reactive dyes.	IV	02
27.	Develop colour discharge effects on cotton using direct and reactive dyes.	IV	02
28.	Develop white resist effect on reactive dyed ground.	IV	02*
29.	Develop colour resist effect on reactive dyed ground.	IV	02
30.	Produce flock printing effect on cotton fabric or garment.	V	02*
31.	Produce pearl printing effect on cotton fabric or garment.	V	02
32.	Produce brasso printing effect on cotton fabric or garment.	V	02
	<b>Total</b>		<b>64</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 24 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 cloth and dye	10
2	Pretreatment ,dyeing or print design	30
3	Choice of colours and chemical	15
4	Quality of presentation	15
5	Answer to sample questions	15
6	Submit report in time	15
<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:

- Follow safety practices.
- Practice good housekeeping.
- Demonstrate working as a leader/a team member.
- Maintain tools and equipments.
- 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
- 'Organizing Level' in 2<sup>nd</sup> year
- 'Characterizing Level' in 3<sup>rd</sup> year.

## 7. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher 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 Glass Ware	1,2
2	Water bath and dye-pot	3,4,5,6, 7, 8. 12. 13, 14, 16. 17
3	Steamer	5,6,18,19,20,21,22. 23, 26, 27, 28. 29
4	Rota dyeing machine	9, 10, 11,
5	HHP dyeing machine	15



S. No.	Equipment Name with Broad Specifications	PrO. No.
6	Curing chamber	24, 25, 30, 31, 32
7	Printing table and accessories	18,19,20,21,22,23, 24,25, 26, 27, 28, 29, 30, 31, 32

### 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 Mechanical and Chemical pre- Treatment</b>	1a. Identify various problem in given grey fabrics. 1b. Describe with sketches the procedure to use relevant singeing machine for singeing of given fabric 1c. Describe with sketches the procedure to use relevant desizing method for given sized fabric 1d. Suggest relevant scouring method on specified textile with justification. 1e. Suggest the need of bleaching in given fabric with justification. 1f. Recommend the need of mercerization process in given situation with justification.	1.1 Introduction and importance of pretreatments, Types of faults in grey fabric, Four point and Ten point system of Fabric inspection, selection and rejection of fabric. 1.2 Shearing and cropping-Importance 1.3 Singeing- Importance, construction and working principle of different singeing machines 1.4 Desizing-Importance and method, efficiency of desizing- Evaluation 1.5 Scouring-Importance and object, scouring process for cotton and polyester, Evaluation of the efficiency of scouring. 1.6 Bleaching-Importance, Mechanism of H <sub>2</sub> O <sub>2</sub> and NaOCl bleaching, Bleaching of cotton, wool and silk by H <sub>2</sub> O <sub>2</sub> and NaOCl bleaching, Evaluation of the efficiency of bleaching. 1.7 Mercerization – Importance, various mercerization processes.
<b>Unit – II Dyeing of Natural Fibre</b>	2a. Describe with sketches the specified dyeing operation using correct terminologies 2b. Describe with sketches the procedure to use relevant method for dyeing of given fabric. 2c. Describe with sketches the procedure to use exhaust method for dyeing of specified type of woolen. 2d. Describe with sketches the procedure to use exhaust method for dyeing of specified type of silk.	2.1 Definition of dye, pigment, percentage shade, exhaustion, expression , colouring matter-classification of dye selection for various textile substrate , Working of padding mangles and jigger machine, winch. 2.2 dyeing procedure for cotton with exhaust and padding with direct, sulphur, vat and reactive dyes, 2.3 Dyeing procedure for wool with acid and basic dye. 2.4 Dyeing procedure for silk with acid and basic dye.

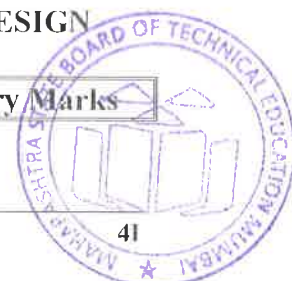


Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
<b>Unit – III Dyeing of Synthetic Fibre</b>	3a. Describe with sketches the relevant method for dyeing of polyester 3b. Describe with sketches the procedure to use relevant techniques in describing intended procedure in blended dyeing 3c. Describe with sketches the one bath dyeing procedure for effective dyeing of the given blend. 3d. Describe the two bath dyeing procedure for effective dyeing of the blend.	3.1 Dyeing procedure - polyester by using carrier, dyeing procedure - polyester by HTHP method, dyeing procedure - polyester by thermosol method 3.2 Blend dyeing technics - solid dyeing, cross dyeing, reverse dyeing and reserve dyeing. 3.3 One bath dyeing method for polyester/ cotton blend-procedure and precautions 3.4 Two bath dyeing method for polyester/ cotton blend-procedure and precautions
<b>Unit – IV Printing Method</b>	4a. Suggest the need of relevant printing process for given fabric with justification. 4b. Select the relevant printing method for effective printing of specified fabric with justification. 4c. Select the relevant style of printing for printing of specified fabric with justification.	4.1 Printing – Objectives, Difference between dyeing and printing, Important print paste ingredients and their functions 4.2 Tie and dye, Batik and block methods of printing, precautions 4.3 Direct style of printing on cotton by using direct and reactive dye, Discharge style of printing on cotton by using direct and reactive dye, Resist style of printing on cotton by using reactive dye, precautions, printing of wool and silk 4.4 Direct style of printing of polyester by using disperses dye.
<b>Unit – V Novel printing Method</b>	5a. Describe the objective of given novel printing. 5b. Describe the salient features of the given two types of novel printing methods. 5c. Describe with sketches the procedure to use the relevant novel printing. 5d. Describe the merits and demerits of the given type of novel printing processes.	5.1 Objectives of novel printing. 5.2 Novel printing methods- Pigment printing, Khadi printing Pearl printing. 5.3 Novel printing methods- Fluorescent printing, Magic printing, foil printing. 5.4 Novel printing methods- Flock printing, High density printing, Brasso printing.

*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	Unit Title	Teaching	Distribution of Theory Marks
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No.		Hours	R Level	U Level	A Level	Total Marks
I	Pre-treatments	12	04	06	08	18
II	Dyeing of natural fabric	12	02	06	06	14
III	Dyeing of synthetic fabric	08	02	04	04	10
IV	Printing method	08	02	04	08	14
V	Novel printing method	08	04	04	06	14
<b>Total</b>		<b>48</b>	<b>14</b>	<b>24</b>	<b>32</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: Student should maintain a notebook where all chemical calculation the new terminologies which are used in the chemical processing will be noted with meanings.

- Students should visit the chemical processing unit and observe the various steps in fabric processing. He will write observations and present a report.
- Student will visit at least three small processing units. He will collect the samples to prepare sample book and report them to teacher.
- Measure concentration of solutions using different concentration units
- Measure concentration of solutions using different concentration units
- Give seminar on any relevant topic.

## 11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES

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).
- With respect to item No.10, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
- Guide student(s) in undertaking micro-projects.

## 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 are 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 are given here. Similar micro-projects could be added by the concerned faculty:

- Data collection:** Visit a local Industry. List the chemical used in pre-treatment process. Find out information of that chemical such as strength, manufacturing process, role of chemical, market cost. List the dyes used in dyeing and printing. Find out information of that chemical such as manufacturing process, role of that dye, market cost.
- Sample collection:** Visit a local Industry. Collect the sample from grey to mercerization and observe the changes take places in each step.
- Shade checking:** Produce the different shade by using same colour and write the observation. Batch of students should prepare relative process parameter chart.
- Garment collection:** Collect the photographs of garment in which special printing effects are used. Classify them and write a brief about each category.
- pH in wet processing:** Prepare chart on chemicals used in textile preparatory processes with their pH. Choose combinations of various chemicals preparatory processes and check their effect and summarize it in the form of chart.
- Comparison:** Compare the results of chemical processing of cotton sample by all methods specified in curriculum and on varieties i.e. cotton, wool and silk.

### 13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1.	Chemical Technology in the Pretreatment Processes of Textile	Karmakar, S. R.	Elsevier Science Publication, Netherlands 1999, ISBN:044450060X
2.	Technology of Bleaching and Mercercizing	Shenai, V. A.	Sevak Publication, Mumbai, 1996
3.	The dyeing of cellulose fibres	Clifford Preston	Dyers co. Publication Trust. England. ISBN: 901956430
4.	Handbook of textile and industrial dyeing	M.Clark	Woodhade publishing Ltd camrich U.K. ISBN: 9781845696955
5.	Chemical processing of textile	Dr.Koushik, C. V.; Antao Irwin Josico	NCUTE, 8 <sup>th</sup> Floor, Main, Building, IIT, Hauz Khas, New Delhi-110016
6.	Textile Printing	L. W. C. Miles	Society of Dyers and Colourists, 1981 ISBN: 9780901956330
7.	Silk dyeing, Printing and Finishing	Gulrajani, M. L.	Department of Textile Technology, IIT Delhi, 1988
8.	Dyeing and Printing	Cockett, S. R., Hilton, K. A.	Leonard Hill Books Ltd. London, 1961, ISBN-13: 9781114785724





9.	Introduction to Textile Printing	Clarke,. W.	Woodhead Publishing Ltd. ISBN-13: 9781855739949
10.	Silk Dyeing, Printing and Finishing	Hurst, George Henry	Rarebooks Club.com,2012 ISBN-13: 9781130986525

#### 14. SUGGESTED SOFTWARE/LEARNING WEBSITES

- a. <http://www.nptel.ac.in/courses/116102005/20>
- b. [http://textilelearner.blogspot.in/2011/03/cotton-desizing-process\\_255.html](http://textilelearner.blogspot.in/2011/03/cotton-desizing-process_255.html)
- c. [http://shodhganga.inflibnet.ac.in/bitstream/10603/24222/9/09\\_chapter4.pdf](http://shodhganga.inflibnet.ac.in/bitstream/10603/24222/9/09_chapter4.pdf)
- d. [http://textilelearner.blogspot.in/2011/03/scouring-treatments-of-cotton-silk-wool\\_4142.html](http://textilelearner.blogspot.in/2011/03/scouring-treatments-of-cotton-silk-wool_4142.html)
- e. <http://textilelearner.blogspot.in/2012/12/bleaching-of-cotton-fiberfabric-with.html>
- f. <http://www.nptel.ac.in/courses/116102016/19>
- g. <http://www.nptel.ac.in/courses/116102016/16>
- h. <http://textilelearner.blogspot.in/2013/06/mercerization-process-of-cotton-fabric.html>
- i. <http://textilelearner.blogspot.in/2013/07/pretreatment-process-of-silk.html>
- j. <http://thesmarttime.com/pretreatment/scouring-of-wool.html>
- k. <http://textilelearner.blogspot.in/2012/09/dyeing-of-cotton-with-direct-dyes.html>
- l. <http://textilelearner.blogspot.in/2012/01/dyeing-of-cotton-fabric-with-reactive.html>
- m. <http://textilelearner.blogspot.in/2012/01/vat-dyeing-process-textile-dyeing.html>
- n. <http://textilelearner.blogspot.in/2012/01/printing-of-cotton-fabric-with-reactive.html>
- o. <https://scanhttp.com/en/disperse-dyes/>
- p. <https://en.wikipedia.org/wiki/Printing>
- q. [http://textilelearner.blogspot.in/2011/07/printing-style-style-of-printing\\_9881.html](http://textilelearner.blogspot.in/2011/07/printing-style-style-of-printing_9881.html)
- r. <http://textilefashionstudy.com/what-is-pigment-printing-advantages-and-disadvantages-of-pigment-printing/>
- s. <https://www.leaf.tv/articles/what-is-brasso-fabric/>
- t. <https://www.prepressure.com/printing/processes/flocking>



