



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Textile Designing

Course / Subject Code: DI03059031

Course / Subject Name: Textile Chemical Process -I

w. e. f. Academic Year:	2024-25
Semester:	3 rd
Category of the Course:	PCC

Prerequisite:	Basic information about fibres, yarns and fabrics, a keen interest in textiles and its applications in designs, creative thinking and have a willingness to explore about various pretreatments & coloring materials used in textiles.
Rationale:	The textile designer should be aware of different chemical processes. Processing of the textiles is one of the important stages in designing textiles. Textile designers need to design & develop various textile products. This demands to have certain knowledge of chemical processing for textiles including colouration & finishing processes. Hence this course aims to gain basic knowledge & hands-on practice to perceive fabric defects, various preparatory processes for colouration, various dyes and their application techniques on suitable fibres and it also makes aware of machineries used for preparatory and coloration processes.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Identify and analyze the grey fabric inspection.	R, N
02	Choose appropriate preparatory processes before colouration.	U, A
03	Classify various dyes and select their application techniques on suitable fibres.	U, A
04	Understand the basics of preparatory and dyeing machineries.	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
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA(M)	PA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150



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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Importance of processing in textile 1.1 Grey fabric inspection 1.2 Fabric defects 1.3 Identification, causes & remedies of fabric defects 1.4 Grey inspection method & Fabric quality grading systems	6	20
2.	Wet Preparatory 2.1 Importance of preparatory processes. 2.2 Different sequences of preparatory processes 2.3 Stitching process 2.4 Brushing & Shearing process 2.5 Singeing process 2.6 Desizing process 2.7 Scouring process 2.8 Bleaching process 2.9 Mercerization process 2.10 Whitening process	10	25
3.	Coloration & Dyeing Theory 3.1 Definition of COLOUR, DYE & PIGMENTS 3.2 Classification of the colouring matters (Dyes & Pigments) 3.3 Dyeing principle 3.4 Dyeing related terms 3.5 Dyeing methods	5	15
4.	Colour Application Techniques 4.1 Properties and nature of various dyes 4.2 Direct dye 4.3 Reactive dye 4.4 Vat dye & Solubilized Vat dye 4.5 Azoic dye 4.6 Sulphur dye 4.7 Disperse dye 4.8 Acid dye 4.9 Basic dye	18	25
5.	Machineries used in processing 5.1 Preparatory machineries 5.2 Dyeing machineries 5.3 Quality control in dyeing	6	15
	Total	45	100



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Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
20	40	30	10	-	-

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:

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Textiles and Fashion Materials, Design and Technology	Rose Sinclair	Woodhead Publishing ltd. ISBN: 9780857095619, 0857095617
2	Weaving: Machines, Mechanisms, Management	M. K. Talukdar, P. K. Sriramulu, D. B. Ajgonkar	Mahajan Brothers, Ahmedabad; 1998 ISBN: 8185401160
3	Bleaching, Mercerising & Dyeing of Cotton Material	R. S. Prayag	Shree J. Printers, Pune, 1990
4	Chemistry of Dyes and Principles of Dyeing (VOLUME-II)	Dr. V. A. Shenai	Sevak Publication, 1973
5	Technology of Dyeing (VOLUME-VI)	Dr. V. A. Shenai	Sevak Publication, 1983
6	Dyeing and Chemical Technology of Textile fibre	E. R. Trotman	Published by Wiley, U.S.A. (1985) ISBN 10: 0471809101 ISBN 13: 9780471809104
7	Cotton Piece Dyeing	S. V. Gokhale	Ahmedabad Textile Industry's Research Association ISBN : B00Q1R6F8C
8	Chemical Technology in the Colouration of Textiles VOL – 1	S. R. Karmakar	Colour Publication PVT. LTD., Mumbai ISBN - 8190259407, 9788190259408
9	HANDBOOK of Textile Fibers, Dyes & Finishes	Howard L. Needles	Garland STPM press (1980), ISBN-10 : 0824070461 ISBN-13 : 978-0824070465



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S. No.	Title of Book	Author	Publication with place, year and ISBN
10	Textile Science - An Introductory Manual	J. T. Marsh	Read Books (2011) ISBN-10 : 144740128X ISBN-13 : 978-1447401285
11	Handbook of Textile Processing Machinery	R. S. Bhagwat	Colour Publication PVT. LTD., Mumbai ISBN - 8175250771, 9788175250772
12	Sustainable Fibres and Textiles	S. S. Mutthu	Elsevier Science ISBN: 9780081020425, 0081020422

(b) Open source software and website:

1. <https://nptel.ac.in/courses/>
2. <http://www.textileworld.com/>
3. www.learningseed.com
4. <http://www.teonline.com/knowledge-centre/>
5. <http://www.sitra.org.in>
6. <http://www.btraindia.com>
7. www.nitratextile.org/
8. <http://www.textileassociationindia.org/>
9. <http://www.nitma.org/>
10. www.itamma.org/
11. <http://www.uttaindia.org/>
12. http://en.wikipedia.org/wiki/Textile_dyeing
13. <http://textilelearner.blogspot.in>
14. <http://www.elearning-textiles.co.uk/CatalogueofModules/>
15. <https://textilestudycenter.com/>
16. <https://www.fibre2fashion.com/>
17. <http://karlmayer.com>
18. <https://textilestudycenter.com/textile-books-free-donwload/>



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Suggested Course Practical List:

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Perform Grey inspection of fabric and Analyze fabric defects	I	02
2	Carry out Desizing of grey material	II	02
3	Carry out Scouring of desized material	II	02
4	Carry out Bleaching of scoured material	II	02
5	Carry out Optical whitening of bleached material	II	02
6	Apply Direct dye on cellulosic (cotton) material	IV	02
7	Apply Cold Reactive dye on cellulosic (cotton) material	IV	02
8	Apply Hot Reactive dye on cellulosic (cotton) material	IV	02
9	Apply Solubilized Vat dye on cellulosic (cotton) material	IV	02
10	Apply Vat dye on cellulosic (cotton) material	IV	02
11	Apply Azoic dye on cellulosic (cotton) material	IV	02
12	Apply Disperse dye on polyester material	IV	02
13	Apply Pigment dye on cellulosic (cotton) material	IV	02
14	Apply Acid dye / Pre-metallized acid dyes on suitable textile material	IV	02
15	Apply Basic dyes on suitable textile material	IV	02
Total			30

List of Laboratory/Learning Resources Required:

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	Electronic weighing balance	2 to 14
2	Glass-wares: Beaker, Pipette, Glass-rods, measuring cylinder, etc.	2 to 14
3	Dye pots	2 to 14
4	Water Heating Bath	2 to 14
5	Lab Padding Mangle	2 to 14
6	Laboratory Oven, steamer	2 to 14



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S. No.	Equipment Name with Broad Specifications	PrO. No.
7	Electric iron, Hot blower	2 to 14
8	HHP dyeing machine (Lab)	2 to 14
9	Heating stove (Gas stoves, electric stoves and induction cook-tops)	2 to 14

Suggested Project List:

- **Classify chemical processes:** Collect samples of differently dyed fabrics and prepare analytical report based on the processes involved for manufacturing. (**Duration: 6-8 hours**)
- **Preparatory Machine study:** Prepare a report on various machines involved in preparatory processing. (**Duration: 8-10 hours**)
- **Dyeing Machine study:** Prepare a report on various machines involved in dyeing. (**Duration: 8-10 hours**)

Suggested Activities for Students: If any

- a) Prepare chart of different fabric defects.
- b) Explore library/internet for application technologies being used for different fibers and dyes.
- c) Visit to processing industry and preparing report with specifications.
- d) Prepare line diagram of machineries for different processes.
- e) Undertake micro-projects in teams.
- f) Give seminar on any relevant topic.

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