GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering
Level: Diploma
Branch: Textile Processing Technology
Subject Code : DI04028011
Subject Name : Finishing Technology

w. e. f. Academic Year:	2025-26
Semester:	4th
Category of the Course:	PCC

Prerequisite:	The basic objective of finishing processes is to improve the attractiveness and appearance of textile materials by enhancing surface texture, softness, smoothness, and luster. It requires basic knowledge of fundaments of textile chemistry and textile fibers and fabric structures. This makes it imperative to understand of fabric behaviour under mechanical and chemical treatments, fabric properties related to dimensional stability
Rationale:	The course aims to impart knowledge and understanding of the chemistry, mechanism and application process of various textile finishes. It aims to enhance the awareness of future trends in textile finishing. The polytechnic graduates are required to supervise pretreatment operations of fibre, yarn & fabric and their dyeing, printing & finishing processes in industry. They should have basic knowledge and skills to handle various finishing processes for different textiles as per the production requirements. This course provides in depth knowledge about mechanical and chemical processes of all type of textiles, chemistry and chemical technology involved in the application of various essential chemicals for finishing. The course also provides the clear concept about the physical & chemical behaviour of various textiles and enables to conduct technological set up for various finishing processes according to their characteristic & requirements.

Course Outcome:
After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Understand the fundamentals of textile finishing, including objectives, classifications, finishing machines & processes in improving fabric performance and aesthetics.	Understand
02	State the objectives of various mechanical finishing processes and explain their underlying mechanisms.	Remember & Understand
03	Understand shrinkage causes and measurement, describe anti-shrink finishes like sanforising and heat setting.	Understand & Apply

04	Explain the chemistry, properties, and industrial applications of soft and stiff finishes, including related finishing machines and novel methods.	Understand & Apply
05	Understand the chemistry, mechanisms, and applications of specialty finishes including water and flame repellency, anti-pilling, anti-static, microbial protection, UV protection, fragrance, bio-polishing, and super hydrophobic finishes.	Understand & Apply

**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
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA(M)	PA (I)	ESE (V)	
3	0	2	3	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**1.1 Introduction and Importance of Finishing Processes** 1.2 Objective of Textile Finishing 1.3 Basic Terms Used in Finishing: Handle/Feel, Drape, Stiffness, Smoothness, Fullness, Lustre, Shrinkage, Dimensional Stability, Crease Recovery, etc. 1.4 Classification of Finishing Mechanical & Chemical, Temporary & Durable/Permanent finishes. 1.4.1 Difference between Mechanical & Chemical finishing 1.4.2 Difference between Temporary and Permanent finishing 1.5 Introduction to Eco-friendly and Sustainable Finishing 1.6 Need for low-pollution, low-energy processes 1.7 Enzymatic finishes and reduced use of harmful chemicals (only concept level)	9	20
2.	**Mechanical Finishes 1: Objectives, Mechanism and Applications** 2.1 Calendaring 2.2 Raising 2.3 Decatising 2.4 Zero-Zero Finishing	9	20

	2.5 Pre-Drying – Hydro extractor & Scutcher 2.6 Drying – Cylinder Dryer 2.7 Conditioning and Damping		
3.	**Mechanical Finishes 2: Objectives, Mechanism and Applications** 3.1 Anti-Shrink Finish – Introduction 3.1.1 Shrinkage in different types of fabric 3.1.2 Cause of shrinkage & Measurement of residual shrinkage 3.1.3 Sanforising 3.1.4 Rigmel Finish 3.2 Heat-Setting 3.3 Industrial practices of heat setting of polyester and its blends 3.4 Finishing Machines 3.4.1 Mangle & their function and related terms 3.4.2 Stenter machine – Construction and Working	9	20
4.	**Chemical Finishes 1: Objectives, Mechanism and Applications** 4.1 Soft Finishing – Introduction 4.1.1 Properties of softeners 4.1.2 Different Types of Softeners and their Chemistry & Mechanism of action 4.1.3 Silicone softeners 4.1.4 Additives 4.1.5 Applications of Softeners 4.2 Stiff Finishing – Introduction 4.2.1 Types of stiff finish 4.2.2 Starch and its properties 4.2.3 Starch Finish and its composition 4.2.4 Synthetic Polymers for stiff finish 4.2.5 Machines for Stiff Finish: Mangles and Cylinder dryers 4.3 Novel Method: Parchmentising 4.4 Milling and Shrink-Proofing of Wool 4.5 Easy Care Finishing – Introduction 4.5.1 Types of Easy Care Finishes 4.5.2 Definitions associated with easy care finish 4.5.3 Reasons for crease formation & Factors affecting wrinkling 4.6 Resin finishing 4.6.1 Formaldehyde-based finish 4.6.2 Formaldehyde-free finish	8	20
5.	**Functional Finishes: Objectives, Chemistry, Mechanism and Applications** 5.1 Water Proof & Water Repellent	10	20

	5.2 Flame Proof & Flame Retardant 5.3 Anti-Pilling, Anti-Static & Soil-Release Finishing 5.4 Mildew-Proofing, Rot-Proofing, Moth-Proofing & Anti-Microbial Finish 5.5 Insect Resistant/Repellent Finish 5.6 UV Protection Finish 5.7 Fragrance Finish 5.8 Bio-Polishing Finish 5.9 Super Hydrophobic Finish – Lotus Leaf Effect		
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
30	**30**	**30**	**10**	**0**	**0**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

Books:

1. Textile Finishing by V A Shenai
2. Introduction to Textile finishing by J.T. Marsh
3. Chemical Processing of Synthetic Fibres & Blends by Datye & Vaidhya
4. Functional finishes for textiles by Paul, Roshan
5. Principles of textile finishing by Choudhory, Asim kumar Roy
6. Chemical finishing of textiles by W D Schindler and P J Hauser- Woodhead Publishing Ltd
7. Textile fibres, dyes, finish and process by Howard L. Needles
8. Textile Finishing: Recent developments and future trends by K.L.Mittal, Thomas Bhaners

Open source software and website:

1. www.nptel.iitm.ac.in
2. https://ndl.iitkgp.ac.in
3. www.textileschool.com
4. www.textileguide.chemsec.com
5. www.textilelearner.net
6. www.textiletutorials.com
7. www.textilefashionstudy.com

Suggested Course Practical List:

1. Impart caledaring effect to cotton fabric.
2. Impart raising effect to polyester knitted fabric.
3. Heat setting of Polyester fabric at different stages.
4. Heat setting of Nylon fabric at different stages.
5. Softening of cotton and polyester fabric using cationic softener.
6. Softening of cotton and polyester fabric using silicone softener.
7. Impart different softeners to cotton or polyester fabric and differentiate between them.
8. Temporary stiffening of cotton/viscose rayon fabric.
9. Permanent stiffening of cotton/viscose rayon fabric.
10. Parchmentising of cotton fabric.
11. Measure residual shrinkage of variety of fabrics.
12. Crease resistant finishing of cotton fabric using formaldehyde based resin.
13. Crease resistant finishing of cotton fabric using non-formaldehyde based resin.
14. Water proof finishing of cotton fabric.
15. Water repellent finishing of cotton fabric.
16. Fire retardant finishing of cotton fabric.
17. Anti-pilling of polyester fabric.
18. Anti-static finishing of polyester fabric.
19. Soil-release finishing of polyester fabric.
20. Anti-microbial finishing of cotton fabric.
21. Insect repellent finish on cotton or polyester fabric.
22. Fragrant finishing of textile.
23. Bio-polishing finish on cotton fabric.
24. Lotus leaf effect on polyester fabric.

List of Laboratory/Learning Resources Required:

1. Electric Oven
2. Water Heating Bath
3. Electronic Weighing Balance
4. Suitable Glassware

Suggested Project List:

1. Chart preparation on classification of different finishing processes with sample fabrics.
2. Heat-setting of polyester and blends: parameter optimization and impact on dimensional stability.
3. Preparation and evaluation of softener-treated fabrics using different chemical softeners.
4. Study on mechanical softening vs chemical softening effects on fabric handle.
5. Process Control and Quality Control parameters for different finishes.

6. Working principle of stenter machine and its role in finishing.

Suggested Activities for Students: If any

1. Group discussion and presentation on the importance and objectives of textile finishing.
2. Comparative chart creation for mechanical vs chemical finishes and temporary vs permanent finishes.
3. Visit to a fabric finishing unit (physical or virtual tour) to observe finishing machines like mangles and stenters.
4. Demo or video analysis of zero-zero finishing mechanism and process control.
5. Group project on comparing mechanical vs chemical soft finishes on fabric hand feel.
6. Wrinkle formation study by creasing fabric samples and testing the effect of easy care finishes.
7. Create a small exhibit or poster explaining the chemistry, mechanism, and applications of each specialty finish.
8. Design a fragrance or bio-polishing finish trial and document the sensory changes.
9. Machine parts identification and working demonstration of mangle and stenter.
10. Conditioning and damping of fabrics: students measure and record moisture content before and after treatments.

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