GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)
Semester - IV

Course Title: Finishing Technology for Textiles
(Course Code: 4342802)

Diploma program in which this course is offered	Semester in which offered
Textile Processing Technology	4th Semester

1. RATIONALE

The polytechnic graduates are required to supervise finishing operations of different textiles in industry. They should have basic knowledge and skills to handle the finishing processes for different textiles as per the production requirements. This course provides in depth knowledge about finishing processes for all type of textiles as well as chemistry andchemical technology involved in the application of various essential chemicals for textile 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.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competency,

- **Identify and utilize speciality chemicals for improvement of quality as well as aesthetic value of various textiles as per requirements.**

3. COURSE OUTCOMES (COs)

The practical exercises, the underpinning knowledge and the relevant soft skills associated with the identified competency are to be developed in the student for the achievement of the following COs:

a) Describe general aspects of Textile finishing technology.
b) Conduct appropriate mechanical finishes on textiles.
c) Conduct appropriate chemical finishes on textiles.
d) Conduct appropriate functional finishes on textiles.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA	ESE	CA	ESE	
3	0	2	4	30*	70	25	25	150

(*): Out of 30 marks under the theory CA, 10 marks are for assessment of the micro-project to facilitate integration of Cos and the remaining 20 marks is the average of 2 tests to be

taken during the semester for the assessing the attainment 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, **CA** – Continuous Assessment; **ESE** – End Semester Examination.*

5. SUGGESTED PRACTICAL EXERCISES

The following practical outcomes (PrOs) are the sub-components of the Cos. *Some of the **PrOs** marked **'*'** (in pprox.. Hrs column) are compulsory, as they are crucial for that particular CO at the 'Precision Level' of Dave's Taxonomy related to 'Psychomotor Domain'*.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Require
1	Heat setting of Polyester fabric at different stages.	II	02
2	Heat setting of Nylon fabric at different stages.	II	02
3	Sanforizing of cotton fabric.	II	02
4	Parchmentising of cotton fabric.	II	02
5	Temporary stiffening of cotton/viscose rayon fabric.	III	02
6	Permanent stiffening of cotton/viscose rayon fabric.	III	02
7	One bath delustring of viscose rayon fabric.	III	02
8	Two bath delustring of viscose rayon fabric.	III	02
9	Softening of cotton fabric using cationic softener.	III	02
10	Softening of cotton fabric using silicone softener.	III	02
11	Crease resistant finishing of cotton fabric.	III	02
12	Anti-static finishing of polyester fabric.	III	02
13	Anti pilling of polyester fabric.	III	02
14	Water repellent finishing of cotton fabric.	IV	02
15	Water proof finishing of cotton fabric.	IV	02
16	Fire retardant finishing of cotton fabric.	IV	02
17	Anti-microbial finishing of cotton fabric.	IV	02
18	Fragrant finishing of textile.	IV	02
	Total Hours		**36**

Note

i. *More **Practical Exercises** can be designed and offered by the respective course teacher to develop the industry relevant skills/outcomes to match the Cos. The above table is only a suggestive list.*

ii. *The following are some **sample** 'Process' and 'Product' related skills (more may be added/deleted depending on the course) that occur in the above listed **Practical Exercises** of this course required which are embedded in the Cos and ultimately the competency.*

S. No.	Sample Performance Indicators for the PrOs	Weightage in %
1	Prepare experimental set-up.	20
2	Performing the experiment.	20
3	Follow safe practices.	10
4	Record observations correctly.	20
5	Interpret the result and conclude.	20

S. No.	Sample Performance Indicators for the PrOs	Weightage in %
6	Submission of report in time	10
Total		**100**

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

This major equipment with broad specifications for the PrOs is a guide to procure them by th4e administrators to usher in uniformity of practicals in all institutions across the state.

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	Dye Pots: 250 ml, 500 ml	All
2	Glass rod / Steel rod	All
3	Beaker: 100 ml, 250 ml, 500 ml	All
4	Measuring Cylinder of capacity 10 ml, 25 ml, 100 ml	All
5	Water bath	1 to 5
6	Electric Iron: 230V, 1000W	All
7	Laboratory Pressure Steamer: 30 psi and 150°C	NA
8	Laboratory Drying, Curing and Setting Chamber: Temperature upto 220°C, working width - 450mm, length 1.7 meter, heater capacity - 8/16/24 kilo-watt	All
9	Laboratory Padding Mangle: Horizontal	6 to 18
10	Digital weighing balance: 0.02 gm accuracy (100 gm)	All

7. AFFECTIVE DOMAIN OUTCOMES

The following ***sample*** Affective Domain Outcomes (ADOs) are embedded in many of the above mentioned Cos and PrOs. More could be added to fulfil the development of this competency.

a) Work as a leader/a team member.
b) Practice good housekeeping
c) Maintain tools and equipment.
d) Follow ethical practices.

The ADOs are best developed through the laboratory/field based exercises. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

i. 'Valuing Level' in 1st year
ii. 'Organization Level' in 2nd year.
iii. 'Characterization Level' in 3rd year.

8. UNDERPINNING THEORY

The major underpinning theory is given below based on the higher level Uos of *Revised Bloom's taxonomy* that are formulated for development of the Cos and competency. If required, more such higher level Uos could be included by the course teacher to focus on attainment of Cos and competency.

Unit	Unit Outcomes (Uos) (4 to 6 Uos at different levels)	Topics and Sub-topics
Unit – I **Introduction to Textile Finishing**	1a. Describe various finishing process 1b. Describe finishing for cotton, synthetics & their blends (yarn, woven & Knits)	1.1 Objects of textile finishing 1.2 Classification of textile finishes 1.3 General parameters considered for textile finishing 1.4 Difference between mechanical & chemical finishing
Unit– II **Technology of Mechanical Finishes**	2a. Explain purposes of Mechanical finishes of textile Materials. 2b. Describe various Mechanical finishes 2c. Explain equipment being used for mechanical finishes	2.1 Hydro extraction 2.2 Cylinder drying 2.3 Heat setting process 2.4 Sanforising process 2.5 Calendaring 2.6 Raising process 2.7 Parchmentising 2.8 Milling process
Unit– III **Technology of Chemical Finishes**	3a. Describe purposes of chemical finishes of textile Materials. 3b. Describe various chemical finishes 3c. Explain chemistry involved in chemical finishes of textiles	Objectives, mechanism and application of following chemical finishes. 3.1 Delustre finish 3.2 Stiff finish 3.3 Cationic, anionic and silicone Soft finish 3.4 Soil release finish 3.5 Crease resistant finish 3.6 Antistatic finish 3.7 Anti pilling finish
Unit– IV **Technology of Functional Finishes**	4a. Describe purpose of functional finish of textiles 4b. Explain different functional finishes for textiles	Objectives, mechanism and application of following functional finishes. 4.1 Antimicrobial finish 4.2 Water Proof finish 4.3 Water repellent finish 4.4 Flame Retardant finish 4.5 Fragrant finish 4.6 U.V. Protection finish

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

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction to Textile Finishing	06	3	4	3	10
II	Technology of Mechanical Finishes	10	4	8	8	20
III	Technology of Chemical Finishes	14	6	8	8	22
IV	Technology of Functional Finishes	12	5	7	6	18
Total		**42**	**18**	**27**	**25**	**70**

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

Note*: This specification table provides general guidelines to assist student for their learning and to teachers to teach and question paper designers/setters to formulate test items/questions assess the attainment of the UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary slightly 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:

- Literature survey of finishing Processes for Various Textile Fabrics.
- Collection and Study of various samples of finishing Process for different textile.
- Visit to textile industries to study finishing requirement and improvement process for cotton, silk,wool & synthetic materials and prepare reports.
- Group discussion on recent innovation in textile finishing.
- Collection of data of finishing of various textiles & Power point Presentation.
- Seminar/Quiz/Presentation on recent developments in the field of textile finishing.

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:

a) Massive open online courses (***MOOCs***) may be used to teach various topics/sub topics.
b) Guide student(s) in undertaking micro-projects.
c) ***'L' in section No. 4*** means different types of teaching methods that are to be employed by teachers to develop the outcomes.
d) About ***20% of the topics/sub-topics*** which are relatively simpler or descriptive in nature is to be given to the students for ***self-learning***, but to be assessed using different assessment methods.
e) With respect to ***section No.10***, teachers need to ensure to create opportunities and provisions for ***co-curricular activities***.
f) Encourage students to refer different websites for having a deeper understanding of the subject.

g) Assign unit wise assignment to group of 4 to 5 students.
h) Use of video, animations, to explain concepts, facts and application related to printing.

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 (group of 3 to 5). However, **in the fifth and sixth semesters**, the number of students in the group should ***not exceed three.***

1. 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 duration of the micro-project should be about **14-16** ***(fourteen to sixteen) student engagement hours*** during the course. The students 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. This has to match the competency and the Cos. Similar micro-projects could be added by the concerned course teacher:

a) **Data sheet:** Prepare a data sheet for various combinations of chemicals and their quantities required for finishing of different textiles.
b) **Need of Finishing:** Collect the data for various finishing process through industrial survey and internet search.
c) **Sample collection:** Visit Textile Industries / Market shops and collect sample of different types of finished textiles.
d) **Finishing machines:** Prepare a short video of different finishing machines by visiting industries and arrange as per process sequences.
e) **Recent development:** Prepare a report on new technologies developed in the field of finishing of textiles in industries.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Textile Finishing	R. S. Prayag	Shree J. Printers, Pune
2	Technology of Textile Finishing (Vol-X)	Dr. V. A. Shenai	Sevak Publications
3	An introduction to Textile Finishing	J. T. Marsh	B. I. Publication Pvt. Ltd.
4	Handbook of Textile Processing Machinery	R. S. Bhagwat	Colour Publication PVT. LTD., Mumbai
5	Chemistry & Technology of Fabric Preparation & Finishing	Dr. Charles Tomasino	North Carolina State University Press

14. SOFTWARE/LEARNING WEBSITES

a) https://nptel.ac.in
b) www.youtube.com
c) www.fibre2fashinon.com
d) www.textilelearner.net
e) www.textiletutorials.com
f) www.textilefashionstudy.com

15. PO-COMPETENCY-CO MAPPING

Semester IV	Finishing Technology for Textiles – 4342802						
	POs						
Competency & Course Outcomes	PO 1 Basic & Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation &Testing	PO 5 Engineering practices for society, sustainability & environment	PO 6 Project Management	PO 7 Life-long learning
Competency	Identify and utilize speciality chemicals for improvement of quality as well as aesthetic value of various textiles as per requirements.						
Course Outcomes CO a) Describe general aspects of Textile finishing technology.	3	0	0	0	0	0	2
CO b) Conduct appropriate mechanical finishes on textiles.	3	2	2	3	0	0	2
CO c) Conduct appropriate chemical finishes on textiles.	3	2	2	3	0	0	2
CO d) Conduct appropriate functional finishes on textiles.	3	2	2	3	0	0	2

*Legend: '**3**' for high, '**2**' for medium, '**1**' for low and '**-**' for no correlation of each CO with PO.*

16. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

S. No.	Name and Designation	Institute	Contact No.	Email

1)	Mr. D. D. Vyas Lecturer	Dr. S. & S. S. Ghandhy College of Engg. & Tech., Surat	9879479424	ddvyas4edu@gmail.com
2)	Mr. R. D. Joshi Lecturer	R. C. Technical Institute, Sola, Ahmedabad	9426387274	rdjrcti@gmail.com
3)	Mrs. P. A. Prajapati Lecturer	R. C. Technical Institute, Sola, Ahmedabad	9920532970	parul10.iitd@gmail.com