

Government Polytechnic, Pune

'180 OB' – Scheme

Programme	Diploma in ET/CE/EE//ME/MT/CM/IT/DDGM
Programme code	01/02/03/04/05/06/07/08/16/17/21/22/23/24/26
Name of Course	Textile Chemistry
Course Code	SC2107

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)				Total Credits (L+T+P)	Examination Scheme				
L	T	P	C		Theory		Practical		Total Marks
L	T	P	C	Marks	ESE	PA	*ESE	PA	Total Marks
03	00	02	05	80	20	25	25	150	
				Exam Duration	3 Hrs.	1 Hr.	2 Hrs.		

(*):OE/POE (Oral Examination/Practical Oral Examination mention whichever is applicable)

Legends: L- lecture-Tutorial/teacher guided theory practice,P-practical,ESE-End semester examination,PA- Progressive Assessment.

2. RATIONALE

Identify chemical properties of fibers by studying relevant chemical finishes, dyes, bleaches for increasing quality of fiber. Students should be aware of various basic parameters for quality fibers. Study of impurities and hardness in water and methods for water softening will help the students to make proper use of water.

3. COMPETENCY

The aim of this course is to help the students to attain the following competency through various learning teaching learning experiences-

Apply principles of textile chemistry to identify and maintain quality of fibers.

4. COURSE OUTCOMES (COs)

The theory, practical experiences and behavioral skills associated with this course are to be taught and implemented, so the student will be able to exhibit the following Cos:

1. Identify physical and chemical properties of fibers.
2. Select chemical finishes for given fiber.
3. Use of dyes according to chemical properties.
4. Use relevant water treatment process to solve industrial problems.
5. Select relevant cleaning agent.

5. SUGGESTED PRACTICALS/ EXERCISES

The practical's 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.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1.	1	Determine longitudinal and cross section of fiber (cotton, linen wool, silk nylon, polyester, and acrylic) by using pick glass.	1	04
2.		Compare characteristics of fibers (cotton, linen wool silk nylon, polyester, and acrylic) by burning test of fibers in flame	1	04
3.		Compare characteristics of fibers (cotton, linen wool silk nylon, polyester, acrylic) by Solubility test in chemical reagent.	1	04
4.	2	Removal of water-soluble sizes.	2	02
5.	3	Prepare of flow chart showing dyeing textile material (sample collection of textiles)	3	02
6.	4	Bleaching of cotton and silk by using hydrogen peroxide	3	04
7.	5	Determine of hardness of given water sample by EDTA method.	4	02
8.		Determine of chlorine hardness of water by Mohr's method	4	02
9.		Determine water hardness by using Soap test	4	02
10.	6	Stain removal of different fabrics by using acid and base or white petrol.	5	02
11.		Preparastarch, borax and gelatin solutions	5	04
		Total Hrs.		32

S.No.	Performance Indicators	Weightage in %
a.	Prepare experimental set up and chemicals required	20
b.	Handling of instruments and chemicals during performing practical.	20
c.	Follow Safety measures	10
d.	Accuracy in calculation and comparison and result	10
e.	Answers to questions related with performed practices.	20
f.	Submit journal report on time	10
g.	Follow Housekeeping	10
	Total	100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

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

Sr.No.	Major Equipment/ Instruments Required	PrO.No.
1	Magnifying glass (pick glass.)	10

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 1. TEXTILE FIBERS (Weightage-16,Hrs.-08)	
1a. Define textile fiber. 1b. State characteristics of textile fibers. 1c. Classify fibers on the basis of their source. 1d. State physical and chemical properties of fibers. 1e. Compare fibers on the basis of physical and chemical properties.	1.1 Definition of textile fibers, classification of fiber based on its source. 1.2 Physical and chemical properties of cotton, linen, wool, silk, asbestos fiber, nylon, polyester, acrylic. 1.3 Physical properties: composition, structure, length, strength, moisture absorption, shrinkage, resiliency, heat conductivity 1.4 Chemical properties: action of acids, action of alkalis, action of bleach, affinity for dyes.
UNIT 2. FINISHES (Weightage- 12,Hrs.- 09)	
2a Define finishes. 2b. State purposes of finishing. 2c. Classify finishing based on textile processing. 2d. Describe preliminary treatment involved in finishing. 2e Explain effects of chemical finishes on fibers. 2f. Distinguish between waterproof and water repellent finishes.	2.1 Definition of finishes, purposes of finishing. 2.2 Classification of finishing on the basis of textile processing (mechanical finishes, chemical finishes) 2.3 Preliminary treatment involved in finishing, bleaching, scouring, singeing, desizing. 2.4 Chemical finishes: mercerizing, Crease resistance, fire proof, and water proof, water repellent
UNIT 3. DYES (Weightage- 12,Hrs.- 09)	
3a. Define dyes 3b. Classify dyes according to their sources. 3c. List the types of dyes. 3d. Select relevant dyes for different fibers. 3e. Draw process flow chart of dyeing materials.	3.1 Definition of dye, classification of dyes according to their sources: natural dyes, vegetable, animal, mineral. Artificial dyes: direct or salt, basic, acidic, Sulphur, mordant, vat, disperse, reactive, 3.2 Dyes applied to fiber classes-cellulose fiber, polyamide, polyester, acrylic mineral, metallic, vinyl. 3.3 Process flow chart showing dyeing textile material.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 4. BLEACHES AND THEIR STABILITY (Weightage- 16,Hrs.- 08)	
4a. Define bleaching agent 4b. Classify bleaches 4c. State Purposes of bleaching 4d. Describe mechanism of bleaching 4e. Explain the action of oxidizing and reducing bleaches 4f. Describe over bleaching.	4.1 Definition of bleaching agent, classification of bleaches: oxidizing and reducing, Purposes of bleaching. 4.2 Mechanism of bleaching. 4.3 Oxidizing: sodium hypo chloride, hydrogen peroxide, sodium perborate, potassium permanganate, sunlight. 4.4 Reducing: sodium sulphite, sodium bisulphate, sodium thiosulphite, over bleaching.
UNIT 5.WATER (Weightage- 12,Hrs.- 06)	
5a. Define hard water and soft water 5b. State causes of hardness of water 5c. List types of hardness. 5d. Explain the bad effects of hard water in dye and textile industries. 5e. Describe the method of removal of hardness by zeolite process. 5f. Describe the method of removal of hardness by ion exchange method. 5g. State applications of pH in engineering. 5h. Calculate the pH and pOH.	5.1 Definition of hard water and soft water, causes of hardness, types of hardness. 5.2 Bad effect of hard water in industries (textile, dye) 5.3 Removal of hardness by lime soda method, zeolite, ion exchange method 5.4 pH scale, applications of pH in engineering. Numerical based on pH and pOH
UNIT6.MAINTAINANCE OF FIBRES (Weightage- 12, Hrs.- 08)	
6a. List the components of soap and detergent. 6b. Describe action of soap and detergent. 6c. Distinguish between soap and detergent. 6d. Describe preparation of starch, gum, borax and gelatin solution. 6e. List types of blues. 6f. Explain bluing process. 6g. Classify stains. 6h. Select proper method of stain removal for different fabrics.	6.1 Cleaning agent: soap- chemical composition, action of soap. Detergent: chemical composition, action of detergent Difference between soap and detergent. 6.2 Stiffening agent: starch, gum, gelatin, borax, Preparation and application of starch solution, (Boiling water starch, Cold water starch) gum, borax, and gelatin. 6.3 Whitening agent: Laundry blues, types of blues, bluing process Stain removal- Classification of stains, methods of removal of stains from

8. 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	TEXTILE FIBRE	8	10	6	0	16
II	FINISHES	9	6	4	2	12
III	DYES	9	6	4	2	12
IV	BLEACHES AND THEIR SUTABILITY	8	8	4	4	16
V	WATER	6	6	4	2	12
VI	MAINTAINANCE OF FIBRES	8	6	2	4	12
Total		48	42	24	14	80

9. 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

- Prepare journals based on practical performed in laboratory.
- Preparation of flow chart showing dyeing textile materials.
- Search information about new synthetic textile fibers.
- Prepare posters to illustrate the use of different fibers.

10. 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.
- 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.8, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
- Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

NA

12. SUGGESTED LEARNING RESOURCES

S.N.	Title	Author, Publisher, Edition and Year of publication	ISBN Number
1	Polytechnic Chemistry	V.P. Mehta, Jain brothers, New Delhi.	818360093X
2	Applied Chemistry	P.C.Jain and Monica Jain, Dhanpat Rai and sons, New Delhi.	9352160002
3	Applied Chemistry	S.N.Narkhede, M. M. Thatte, NiraliPrakashan, Pune.	Textbook
4	Text book of clothing and laundry	Shina Gupta, Renu Garg, Renusaini	Textbook
5	Elements of Textile Chemistry	(SNDT)	Textbook

13. SOFTWARE/LEARNING WEBSITES1.[https://en.wikipedia.org/wiki/Textile manufacturing](https://en.wikipedia.org/wiki/Textile_manufacturing)2 <https://textilelearner.blogspot.com/2012/02/textile-manufacturing-process-process.html>3.[https://en.wikipedia.org/wiki/List of textile fibres](https://en.wikipedia.org/wiki/List_of_textile_fibres)4.[https://en.wikipedia.org/wiki/Finishing \(textiles\)](https://en.wikipedia.org/wiki/Finishing_(textiles))5<http://apsacwestridge.edu.pk/assets/admin/upload/notes/ClassificationOfDyes.pdf>**14. PO - COMPETENCY- CO MAPPING**

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	1		1
CO2	3	2	1		1
CO3	3	2	1	1	1
CO4	3	2	1	1	1
CO5	3	2	1		1

	PSO1	PSO2
CO1	1	-
CO2	1	-
CO3	1	-
CO4	1	-
CO5	1	-

Sign:	Sign:
Name: K.V. Mankar (Course Expert)	Name: Head of the Department
Sign:	Sign:
Name: Programme Head	Name: CDC Incharge