



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Textile Processing Technology

Subject Code : DI04028021

Subject Name : Dyeing Technology - II

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

Prerequisite:	A foundational understanding of dyeing technology – II requires prior knowledge in basic dye chemistry and application. Students should be familiar with various applications and chemistry of dyes for synthetic textile fabrics. Additionally, fundamental concepts of chemistry will aid in the preparation of dye solution for various synthetic textile dyeing processes. Familiarity with basic chemical & their functions, terminologies and processes will also be required, enabling students to contextualize their learning within the broader textile wet processing industry.
Rationale:	The polytechnic graduates are required to supervise operations of fibre, yarn and fabric for their dyeing & printing processes in industry. They should have basic knowledge and skills to handle dyeing and printing processes. The course on Dyeing Technology - II have been designed to provide basic knowledge and skills as well as recent technological developments in the area of dyeing. This course also provides concepts of various dyes , dyeing terms and auxiliaries used for dyeing as well as methods and machines of synthetic textile dyeing technology.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Select relevant dyes, auxiliaries and machineries with the concepts of dyeing technology	R +U + A
02	Use relevant dyeing method for dyeing of polyamide textiles.	R + U + A
03	Use relevant dyeing method for dyeing of polyester textiles.	R + U + A
04	Use relevant dyeing method for dyeing of acrylic textiles.	R + U + A
05	Use relevant dyeing method for dyeing of various blends and knitted textiles.	R + U + A

*Revised Bloom's Taxonomy (RBT)



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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

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Textile Dyeing and Machineries 1.1 Acid dyes, direct dyes, reactive dyes, metal complex dyes, chrome dyes and disperse dyes etc. for dyeing of synthetic textiles 1.1.1 Properties 1.1.2 Classification 1.2 Principle, construction and Working Mechanism of Dyeing Machines: 1.2.1 Jet Dyeing Machines (U-Tube, Long Tube & Soft Flow Dyeing Machines) 1.2.2 Beam Dyeing Machine 1.2.3 Merits and Demerits of above dyeing machineries. 1.3 Faults and their remedies for above dyeing machines.	10	15
2.	Dyeing of Polyamide Textiles 2.1 Dyeing of Polyamide with Acid Dyes and metal complex dyes 2.1.1 Mechanism 2.1.2 Application 2.1.3 Parameters affecting dyeing 2.1.4 Role of auxiliaries used in dyeing 2.2 Dyeing of polyamide with direct dyes, reactive dyes, chrome dyes and disperse dyes 2.3. After treatments: 2.3.1 Washing 2.3.2 Soaping 2.3.3 Stripping 2.4 Faults obtained in polyamide dyeing and their remedies	10	25



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3.	Dyeing of Polyester Textiles 3.1. Dyeing of Polyester with Disperse dyes 3.1.1 Mechanism 3.1.2 Application 3.1.3 Parameters affecting dyeing 3.1.4 Role of auxiliaries used in dyeing 3.2 Application methods: 3.2.1 Exhaust Dyeing without Carrier 3.2.2 Exhaust Dyeing with Carrier 3.2.3 HTHP Dyeing 3.2.4 Thermo-fixation 3.3. After treatments: 3.3.1 Reduction Clearing Treatment 3.3.2 Stripping 3.4 Faults obtained in dyeing and their remedies 3.5 Difference between regular polyester and micro denier polyester and CDPET and their dyeing procedures with necessary precautions	10	25
4.	Dyeing of Acrylic Textiles 4.1 Dyeing of Acrylic with Cationic dyes 4.1.1 Mechanism 4.1.2 Application 4.1.3 Parameters affecting dyeing 4.1.4 Role of auxiliaries used in dyeing 4.2 Application of disperse dyes on Acrylic 4.3 After treatments: 4.3.1 Washing & Soaping 4.3.2 Stripping	07	15



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5.	<p>Dyeing of Various Blends and knitted Textiles</p> <p>5.1 Blending of Textile Fibres</p> <p style="padding-left: 20px;">5.1.1 Necessity and advantages of Blending various textile fibres</p> <p style="padding-left: 20px;">5.1.2 Blending of natural and synthetic textile fibres.</p> <p style="padding-left: 20px;">5.1.3 Definition: Cross-dyeing, Solid shade, Contrast shade, Two-tone Effect, Reserve Dyeing.</p> <p>5.2 Dyeing of Polyester/Cotton and Polyester/Viscose Rayon Blends</p> <p style="padding-left: 20px;">5.2.1 Different dyes used for dyeing of P/C & P/V Blend.</p> <p style="padding-left: 20px;">5.2.2 Single phase & Two phase dyeing of P/C & P/V Blend with flow charts</p> <p style="padding-left: 20px;">5.2.3 Batch/Semi-continuous/Continuous dyeing of P/C & P/V Blend.</p> <p>5.3 Dyeing of Polyester/Wool, Polyester/CDPET and Polyester/Lycra Blends.</p> <p>5.4 Dyeing of knitted textiles</p> <p style="padding-left: 20px;">5.4.1 Difference between dyeing of woven and knitted fabrics</p> <p style="padding-left: 20px;">5.4.2 Process flow chart for dyeing</p>	08	20
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
20	40	40	0	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:

(a) Books:

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	Technology of Dyeing (Vol-VI)	Dr V.A. Shehnai	Sevak Publications
2	Chemistry of Dyes and Principles of Dyeing (VOLUME-II)	Dr V.A. Shehnai	Sevak Publications



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3	Handbook of Textile Processing Machinery	R. S. Bhagwat	Colour Publication PVT. LTD., Mumbai
4	Dyeing of Wool, Silk and Man-Made Fibres	R. S. Prayag	Shree J. Printers, Pune
5	Chemical Processing of Cotton and Polyester-Cotton Blends	J. R. Modi & A. R. Garde	The Textile Association (India), Ahmedabad Unit, Ahmedabad
6	Dyeing and Chemical Technology of Textile fibre	E. R. Trotmann	Hodder Arnold, London

(b) Open source software and website:

1. <https://nptel.ac.in>
2. www.youtube.com
3. www.fibre2fashion.com
4. www.textilelearner.net
5. www.textiletutorials.com
6. www.textilefashionstudy.com
7. www.textileschool.com
8. www.textileguide.chemsec.com
9. www.textileassociationindia.org
10. <https://textilechemrose.blogspot.com>

Suggested Course Practical List:

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Dye nylon with acid dye	II	02
2	Dye nylon with metal complex dye	II	02
3	Dye nylon with reactive dye	II	02
4	Dye nylon with disperse dye	II	02
5	Dye combination shade on nylon with acid dye	II	02
6	Dye polyester with disperse dye by exhaust method at boil	III	02
7	Dye polyester with disperse dye by exhaust method at boil with carrier	III	02
8	Dye polyester with disperse dye by HTHP method	III	02



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9	Dye polyester with disperse dye by thermosol method	III	02
10	Dye combination shade on polyester with disperse dye by HTHP method	III	02
11	Dye cationic dyeable polyester with cationic dye	III	02
12	Dye cationic dyeable polyester with disperse dye	III	02
13	Dye acrylic fabric with cationic dyes	IV	02
14	Dye acrylic fabric with disperse dyes	IV	02
15	Dye polyester/cotton blend with disperse/reactive system	V	02
16	Dye polyester/viscose rayon blend with disperse/vat system	V	02
	TOTAL :		32

List of Laboratory/Learning Resources Required:

Sr. No.	Equipment Name with Broad Specifications	PrO. No.
1	Dye Pots: 250 ml, 500 ml	All
2	Glass 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 Heating Bath	All
9	Laboratory Stirrer: 300 to 500 rpm	All
10	Laboratory Oven: 150°C	7-8
12	Laboratory Padding Mangle: Horizontal	All
13	Digital weighing balance: 0.02 gm accuracy (100 gm)	All

Suggested Project List:

- 1) **Dyed sample collection:** Visit textile dyeing industries/market shops and collect at least 20 to 30 various dyed samples of Nylon/Polyester/CDPET/Acrylic/Blend fabrics. Classify them with respect to shade and type of fabric.
- 2) **Cost of dyeing:** Calculate the cost of dyeing with respect to price of dye and chemicals of any two dyeing methods for Polyester.
- 3) **Shade matching:** Collect dyed samples from dye house. Using any class of dye match the shade in laboratory. Present the same with recipe.
- 4) **Dyeing parameters:** Choose any one dyeing process, and change any one dyeing parameter for dyeing process. Prepare a sample report with observations.
- 5) **Dyeing faults:** Visit industries and collect sample of faulty dyeing and find remedies to rectify the same and present the report.



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- 6) **Sample book:** Prepare a sample book of dyes samples of Nylon, Polyester, CDPET, Acrylic & Blend fabrics with various dyes.

Suggested Activities for Students:

- 1) Survey market for various dyes, pigments, auxiliaries and chemicals. Compare them based in dyeing effects, fastness properties, and ecological aspects and costing.
- 2) Collect information about novel dyeing techniques.
- 3) Prepare table for various ingredients used in dyeing of Nylon with their role in dyeing process.
- 4) Prepare table for various ingredients used in dyeing of Polyester & CDPET with their role in dyeing process.
- 5) Prepare table for various ingredients used in dyeing of Acrylic & blends with their role in dyeing process.

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