GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Textile Processing Technology

Subject Code: DI04028031

Subject Name: Printing Technology - II

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

Prerequisite:	A foundational understanding of printing technology – II requires prior knowledge in basic dye chemistry and application. Students should be familiar with various applications chemistry of dyes for synthetic textile fabrics. Additionally, fundamental concepts of chemistry will aid in the preparation of paste for various textile printing 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 Printing Technology - II has been designed to provide basic knowledge and skills as well as recent technological developments in the area of printing for synthetic textiles. This course also provides concepts of various thickeners and auxiliaries used for printing as well as methods and styles of textile printing technology for synthetic textiles.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Select relevant printing style, dyes, ingredients for printing the polyester and CDPET.	R + U + A
02	Use relevant printing styles, dyes, ingredients for printing the nylon and acrylic.	R + U + A
03	Use relevant printing method, style, dyes, and pigments for printing the synthetic and blended fabric.	R + U + A
04	Select transfer printing machine as per the design to print on the fabric.	R + U + A
05	Use relevant ink, inkjet printing technology to print the fabric.	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
				Theory		Tutorial / Practical		
L	T	PR	C	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.	**Printing of Polyester and CDPET** 1.1 Preparation of polyester fabric for printing 1.2 Printing of polyester: 1.2.1 Print paste formulation for Direct, discharge and resist style of printing 1.2.2 Process sequence 1.3 Fixation method: 1.3.1 Pressure Steaming 1.3.2 High temperature steaming 1.3.3 Thermofixation 1.4 After treatment: Reduction clearing 1.5 Printing of CDPET: 1.5.1 Print paste formulation for Direct style of printing 1.5.2 Process sequence	10	20
2.	**Printing of Nylon and Acrylic** 2.1.Preparation of Nylon and acrylic fabric for printing 2.2.Printing of Nylon 2.2.1 Printing of nylon with acid, metal complex, and disperse dye with paste formulation for direct, and discharge style of printing 2.2.2 Process sequence 2.3. Printing of Acrylic 2.3.1 Printing of acrylic with basic and disperse dye paste with formulation for direct style of printing 2.3.2 Process sequence	10	20
3.	**Printing of Synthetic and its blends** 3.1 Printing of Polyester/Cotton blend 3.1.1 Printing with disperse reactive system: Single phase method,	13	30

	two phase method 3.1.2 Printing with disperse vat system 3.1.3 Single dye application: Polystyrene dye 3.1.4 Process sequence 3.2 Printing of Polyester/Wool and Polyester/Acrylic blend 3.2.1 Printing paste formulation for Polyester/wool and Polyester Acrylic blend printing 3.2.2 Process sequence		
4.	**Transfer Printing** 4.1 Transfer Printing: Concepts, Types, Melt transfer, Film release transfer, Semi-wet transfer, Vapour transfer 4.2 Transfer printing paper: Characteristics 4.3 Transfer printing ink: Characteristics of dyes and inks 4.4 Transfer printing machines 4.4.1 Flatbed press transfer 4.4.2 Continuous transfer 4.4.3 Vacuum transfer	06	15
5.	**Digital/Inkjet Printing** 5.1 Digital/Inkjet printing: Concept, Classification, types of nozzles 5.2 Continuous inkjet printing 5.2.1 Binary deflection inkjet printing 5.2.2 Multi-level deflection inkjet printing 5.3 Drop on demand inkjet printing 5.4 Ink for inkjet 5.4.1 Characteristic of ink, dye for printing 5.5 Comparison between inkjet/digital printing and conventional printing	06	15
	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	**35**	**35**	**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 Printing Vol – IV	Dr V.A. Shehnai	Sevak Publications, Mumbai 1990
2	Textile Printing	L.W.C. Miles	Society of Dyers and Colourists, 1981, ISBN: 9780901956330
3	Introduction to Textile Printing	W. Clarke	Wood-head Publishing Ltd., Cambridge, ISBN: 9781855739949
4	Technology of Printing	R. S. Prayag	Shree J. Printers, Pune
5	Digital Printing of Textiles	H. Ujiie	Wood-head Publishing Ltd., Cambridge, ISBN: 9781855739512
6	Ink Jet Textile Printing	Christina Cie	Wood-head Publishing Ltd., Cambridge, ISBN: 9780857092304

(b) 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.textileassociationindia.org
6. https://textilechemrose.blogspot.com
7. www.textilelearner.blogspot.com
8. www.textileapex.blogspot.com
9. www.zimmer-usa.com
10. www.zeprint.com

Suggested Course Practical List:

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Printing of polyester with disperse dye by direct style applying various fixation method.	I	02
2	Printing of polyester using discharge and resist style.	I	04
3	Printing of nylon with acid, metal complex and disperse dye by direct style.	II	04

4	Printing of acrylic and CDPET with basic, and disperse dye by direct style	I II	02
5	Printing of nylon using discharge style.	II	02
6	Printing of Polyester/Cotton blend with disperse-reactive dye with one phase and two-phase method by direct style.	III	02
7	Printing of Polyester/Cotton blend with polystyrene dye by direct style.	III	02
8	Printing of Polyester/Acrylic, Polyester/Wool blend with direct style.	III	02
9	Printing of paper for transfer printing.	IV	02
10	Printing of polyester with transfer printing technology.	IV	02
11	Preparation of printing ink for inkjet/digital printing.	V	02
12	Printing of synthetic fabric with digital printing during industrial visit.	V	04
	Total Hours		30

List of Laboratory/Learning Resources Required:

Sr. No.	Equipment Name with Broad Specifications	PrO. No.
1	Dye Pots: 250 ml, 500 ml	1-9
2	Glass rod	1-9
3	Beaker: 100 ml, 250 ml, 500 ml	1-9
4	Measuring Cylinder of capacity 10 ml, 25 ml, 100 ml	1-9
5	Wooden Screen	1-9
6	Electric Iron: 230V, 1000W	1-11
7	Rubber Squeegee	1-9
8	Laboratory Printing Table	1-11
9	Laboratory Stirrer: 300 to 500 rpm	1-9,11
10	Laboratory Pressure Steamer: 30 psi and 150°C	1-9
11	Laboratory Drying, Curing and Setting Chamber: Temperature upto 220°C, working width - 450mm, length 1.7 meter, heater capacity - 8/16/24 kilo-watt	1-11
12	Laboratory Padding Mangle: Horizontal	2,5
13	Digital weighing balance: 0.02 gm accuracy (100 gm)	1-9,11

Suggested Project List:

1) **Print sample collection:** Visit textile printing industries/market shops and collect at least 20 to 30 various printed samples of polyester/nylon/acrylic and their blend fabrics. Classify them with respect to style and method of printing.
2) **Digital/Inkjet and Transfer printing:** Prepare a short video film of digital/inkjet printing by visiting industries, and also collect the samples.
3) **Performance of thickeners:** collect different thickeners used in textile printing industries, and analyze their performance with respect to viscosity, stability under various pH, and colour yield.
4) **Printed design:** Visit industries and market shops, collect at least 20 samples of different varieties, and analyze the design with respect to pattern, number of colours, percent coverage, overlapping, and blotches.
5) **Sample book:** Prepare a sample book of printed samples of synthetic textiles with various dyes, and printing styles and printing methods.

Suggested Activities for Students:

1) Survey market for various dyes, pigments, auxiliaries and chemicals. Compare them based in print effects, fastness properties, and ecological aspects and costing.
2) Collect information about novel printing techniques.
3) Prepare table for various ingredients used in printing of polyester, nylon and acrylic with their role in printing paste.
4) Prepare table for various ingredients used in printing of synthetic and its blends with their role in printing paste.
5) Survey market for digital/inkjet and transferred printed textile demand and popularity.

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