GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Textile Designing

Subject Code: DI04059071

Subject Name: Digital Printing

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

Prerequisite:	Students should have basic knowledge of textile materials, pretreatment and post-treatment processes, value-added fabrics, and their applications in design. They should possess creative thinking and a willingness to explore the latest printing technologies, software, and textile coloration techniques, including embroidery, weaving, printing, and finishing processes.
Rationale:	Digital textile printing is one of the most advanced and rapidly growing technologies in the global textile sector. It allows designers and manufacturers to print directly on fabric using digital inkjet technology, offering high colour accuracy, fine detail, and fast production. The rationale for introducing and teaching digital textile printing is based on its industrial relevance, technological advantages, demand for skilled manpower, and sustainability requirements.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Understand fundamentals, workflow, and technology used in textile digital printing.	A, N
02	Operate digital printers for Sublimation, Direct, and Position printing.	R, A
03	Create textile designs for printing with Sublimation, Direct and position method	U, C
04	Develop digital printed textile products using global industrial standards and sustainable manufacturing practices.	E, A

**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	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction of Digital textile printing.** 1.1 History and evolution of digital textile Printing 1.2 Types of digital textile printing 1.3 Difference between tradition textiles printing Vs digital textile printing. 1.4 Basic digital printing work flow : Design-Color-Fabric-Print-Post treatment	05	10
2.	**Sublimation digital textile printing.** 2.1 History of sublimation digital textile printing. • Old sublimation techniques for printing. 2.2 Printing machine and printing for Polyester fabric using sublimation digital textile printing. • Pretreatment application on polyester fabrics. • Structure and working of a sublimation digital textile printer and fusing machine. • Print heads : Thermal ,Drop-on-demand.(DOD) 2.3 Design development for sublimation printing. • Design for filament fabric, spun polyester fabric and knitted fabric. • Design for ladies garment fabrics. • Design for men's wear and children wear. • Design for Home textile fabrics. • Advantages and disadvantages of sublimation digital textile printing. • Factors affecting the print quality of sublimation printing .	10	25
3.	**Direct digital textile printing.** 3.1 History and definition of direct digital textile printing. 3.2 Pretreatment of fabric for direct digital textile printing. 3.3 Different printing machine and printing for Cotton, Viscose, Silk and other natural fabric. • Pretreatment application for Cotton, Viscose, Silk and other natural fiber fabric. • Construction, Working and passage of material and function of important parts in direct printing machine. 3.4 Design development for direct digital textile printing. • Recent trends design for Cotton, Viscose, Silk and other natural fiber fabric.	10	25

	• Design for men's and children wear fabric, and knitted fabric. • Design for Home furnishing fabric. • Mood board + concept sheet for direct digital print design. 3.5 Fabric post treatment for direct print fabric. 3.6 Advantages and limitations of direct digital printing 3.7 Recently development in direct digital textile printing.		
4.	**Position digital textile printing.** 4.1 History of position printing. 4.2 Construction of machine and working principle. 4.3 Pretreatment of fabric for position digital textile printing. 4.4 Position print on embroidered fabric 4.7 Position print on jacquard design woven fabric 4.8 Position print on other fabric	10	20
5.	**Industry trends & sustainability.** 5.1 Eco friendly inks with reduced water usages. 5.2 On demand manufacturing. 5.3 Zero waste print Layouts. 5.4 Global industry standards and products. 5.5 Future trends in Digital textile printing.	10	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**
15	**15**	**30**	**10**	**15**	**15**

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:

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Digital textile printing	Susan carden	Bloomsbury Academics ISBN: 978-1-4725-3568-9
2	Digital printing of textile	Hitoshi Ujjie	Woodhead Publishing ISBN: 9781845691585

S. No.	Title of Book	Author	Publication with place, year and ISBN
3	Digital textile printing and the influence on design	Marina rehbein	GRIN Verlag ISBN:9783640602674
4	Digital textile design (Portfolio skill)	Malanie bowles, Ceri isaac	Laurence king publishing ISBN : 9781856695862
5	Textiles and environment	N.N. Mahapatra	WPI India ISBN : 9789380308562
6	Textile printing	N.N. Mahapatra	CRC Press ISBN : 9781040003589
7	Advance in Textile coloration	Mohammad shahid, Ravindra v adivarekar,Saptashri maiti, Shafat ahmed khan	Springer Nature Singapore ISBN: 9789819650910
8	Digital textile design (Second edition)	Ceri Isaac, Melanie Bowles	Laurence king publishing ISBN: 9781780673998
9	Principle of textile printing	Asim kumar roy chaudhry	CRC Press ISBN: 9781000620740
10	Digital Printing	Ashok athalye, Harshad Patl	Springer Nature Singapore ISBN: 978981952928
11	Technology of Printing Vol – IV	Dr. V. A. Shenai	Sevak Publication, Mumbai 1990
12	Textile Printing	L.W.C. Miles	Society of Dyers and Colourists, 1981, ISBN: 9780901956330
13	Introduction to Textile Printing	W. Clarke	Wood-head Publishing Ltd., Cambridge, ISBN: 9781855739949
14	Technology of Printing	R. S. Prayag	Shree J. Printers, Pune
15	Sustainable Fibers and Textiles	S. S. Muthu	Elsevier Science ISBN: 9780081020425, 0081020422

(b) Open source software and website:

1. https://nptel.ac.in/courses/
2. https://ndl.iitkgp.ac.in
3. http://www.textileworld.com/
4. http://www.textileassociationindia.org/
5. http://www.nitma.org/

6. www.itamma.org/
7. http://www.ittaindia.org/
8. https://www.fibre2fashion.com/
9. https://www.voguefashioninstitute.com
10. https://www.youtube.com/watch
11. https://www.youtube.com/watch?v=q_9h6GiYF0I
12. https://www.youtube.com/watch?v=q_9h6GiYF0I
13. https://www.youtube.com/watch?v=XK7XyOCNmSc
14. https://www.youtube.com/watch?v=eeUDnikKBCY&t=208s
15. https://www.youtube.com/watch?v=1seH2Zu9fAE
16. https://www.youtube.com/watch?v=X-smjuKWdIA&t=2495s
17. https://www.youtube.com/watch?v=Q927CXi7KEc
18. https://www.youtube.com/watch?v=VdhO3SlAzCI
19. https://www.youtube.com/watch?v=h5x15DN2iAI
20. https://www.youtube.com/watch?v=NT7yjmOVpl4

Suggested Course Practical List:

S. No.	Practical Outcomes (Pros)	Unit No.	Approx. Hrs. required
1	List out the fabrics on which digital printing can be done.	I	02
2	Collect and study the sample for sublimation printing.	II	02
3	Prepare a saree design for polyester sublimation printing.	II	02
4	Prepare a men/women dress design for polyester sublimation printing.	II	02
5	Prepare a cotton saree/dupatta design for direct printing.	III	02
6	Prepare a viscose dress men/women design for direct printing.	III	02
7	Collect the sample for Direct printing (Cotton, viscose, silk) and do the study.	III	02
8	Create a silk scarf/Dupatta design for direct printing.	III	02
9	Collect the sample for Embroidery position printing and do the study.	IV	02
10	Collect the sample for Jacquard position printing and do the study.		
11	Draw jacquard saree design and do the position print on jacquard woven fabric.	IV	02
12	Draw embroidery dress design and do the position print on embroidered	IV	02
13	Prepare a design for zero waste print layout.	V	02
14	Prepare the list of ecofriendly ink and collect the sample and do the study	V	02
15	Prepare the list of global textile printing standard for sustainable digital printing.	V	02
	Total		**30**

List of Laboratory/Learning Resources Required:

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	Electronic weighing balance	2 to 14
2	Glass-wares: Beaker, Pipette, Glass-rods, measuring cylinder, etc.	2 to 14
3	Sublimation small machine, Heat press machine, Sublimation ink	2 to 14
4	Sublimation transfer paper, Heat resist tape, Teflon sheet/silicon sheet	2 to 14
5	Lint roller/Lint remover, Cutting tools, Heat gloves, Measuring tools,	2 to 14
6	PPE(Safety equipment), RIP software/Printer driver, Computer/Laptop	2 to 14
7	Cooling tray,/Stand, Fabric (Polyester or Polyester coated), Colour checker/Test chart, Storage rack	2 to 14
8	Digital textile printer (Direct to fabric), Pre-treatment/Padding mangle, Dryer curing machine,	2 to 14
9	Steaming machine (For reactive printing),Polymer curing unit (For pigment ink printing), Washing range (For reactive/Acid prints), Stanter machine,	2 to 14
10	Heat press (Small sampling), RIP software & colour management (Ex. Neostampa, Ergosoft,Wasatch, onyx), Pre-treatment chemical, Digital textile ink	2 to 14
11	Embroidered fabric, Jacquard woven fabric, Other value added and surface ornamented fabric.	2 to 14
12	Digital placement textile printer, Positioning jig/template, Laser alignment system, RIP software with placement template tools, High quality pigment/ reactive/ sublimation ink	2 to 14
13	Laboratory Oven	2 to 14
14	Electric iron, Hot blower	2 to 14
15	Laboratory steamer	2 to 14

Suggested Project List:

- **Classify Digital print textile**: Collect samples of differently digitally printed & finished fabrics and prepare analytical report based on the processes involved for manufacturing. (**Duration: 8-10 hours**)

- **Digital Printing Machine study:** Prepare a report on various machines involved in preparatory processing and post treatment. (**Duration: 10-12 hours**)
- **Finishing study:** Prepare a report on various finished effects resulted by various finishes. (**Duration: 8-10 hours**)
- **Sustainable practices:** Collect the natural coloring matter and and develop sustainable manufacturing process. **(6-8 hours)**
- **High value addition products:** Prepare a garment from position print fabric for brand collaboration in Indian and foreign market. **(8-10 hours)**

Suggested Activities for Students: If any

a) Prepare chart of different fabric digital printing methods & styles.
b) Explore library/internet for application/technologies being used for different value added fabrics and garment.
c) Visit to local digital printing industry and preparing report with specifications.
d) Compare the different head printing results in different machine.
e) Undertake micro-projects in teams.
f) Give seminar on any relevant topic.
g) Arrange expert lecture by inviting industry expert.
h) Visit textile machinery exhibition in different cities.
i) Sent teaching faculty to industry for real life experience and learning and to develop relation with industry.

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