GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Printing Technology

Subject Code: DI04058041

Subject Name: Screen Printing Process

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

Prerequisite:	Basic knowledge of Pre-press and Designing
Rationale:	This course aims at developing skills in the screen-printing process and it will cover different technical aspects like copy preparation, mesh selection, frames, stencil systems, printing techniques, ink, substrate compatibility, reclamation of the screen, and use of the screen-printing process for print and finishing. Acquisition of technical skills through practice will help students to set up their own enterprise and get jobs in the field of screen printing.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Select the tools and materials required for a given job.	R, A, E
02	Prepare the stencil as per job requirements.	R, A, E
03	Execute the job according to requirement and print it.	R, A, E
04	Analyze the printing defects and suggests remedies.	R, A, E

**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)	
2	0	2	3	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
Unit – I Introduction to Screen Printing	1.1 Introduction to the screen-printing process 1.2 History and development of the screen-printing process. 1.3 Comparison with other printing processes 1.4 Merits and demerits of the screen-printing process 1.5 Application of screen-printing process like Graphics, Packaging, Automotive, and printed electronics Organization of printing services	06	20
Unit – II Materials for screen printing	2.1 Screen mesh: composition, physical fabrics properties, elongation characteristics of polyester fabrics, mesh count, mesh opening 2.2 Flood coater: working, stroke speed, angle 2.3 Photo emulsion: liquid emulsions and dry emulsions, direct photo stencil, indirect photo stencil, bichromate based emulsions, diazo based emulsions, photopolymer emulsions, dual cure emulsions 2.4 Squeegees: Materials, blade profile, durometer, sharpening and maintenance, instrumentation and tools, shore A hardness tester 2.5 Frames: materials used for the frame, frame size, factors affecting selection of frame 2.6 Substrate and inks: types of substrates and, types of inks	09	30
Unit – III Mesh stretching and screen preparation method	3.1 Mesh stretching: hand stretching, mechanical stretching, pneumatic stretching, the need of mesh stretching monitoring, instrumentation, and tools, screen tension meters 3.2 Pre-press and films: Evaluating film quality, density, and image quality, Resolution, screen angle 3.3 Steps in screen preparation: mesh stretching, degreasing, drying, emulsion coating, drying coated mesh, exposure, development, inspection of the screen, computer to screen 3.4 Stencils: hand-cut, direct, indirect, direct, and indirect, comparison between all types of stencils.	09	30
Unit– IV Screen printing machines	4.1 Different configurations of screen-printing machines like, manual, semi-automatic, automatic, rotary, carousel, etc. 4.2 Advantages and limitations of various configuration. 4.3 Type of clamps: g clamp, c clamp etc.	06	20

and equipment Activities	4.4 Types of dryers: racks, wicket dryers, flatbed dryers, UV dryers		
	Total	**30**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
19	**56**	**25**	-	-	-

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:

1. Screen Printing Technology Hand Book - NIIR Board - Asia Pacific Business Press Inc., India Published in 2003, ISBN: 8178330539
2. The Print and Production Manual - Sean Smyth - Pira International Limited, Randalls Road, Leatherhead, Published in 2008, ISBN-13: 978-1858025148
3. Introduction to Printing - Herbert Simon - Publisher: Faber and Faber, Published in 1963, ISBN-13: 978-0571084081
4. Handbook of Print Media - Helmut Kipphan Ed - Publisher: Heidelberg Druck maschinen AG, Springer Heidelberg, Published in 2001, ISBN 978-3-540-29900-4
5. The Complete Book of Silk Screen Printing Production - J. I. Biegleisen - Publisher: Dover Publications, INC, New York, published in 2000, ISBN-10: 0486211002
6. Printing Technology 5th Edition - J. Michael Adams - Publisher: Delmar Cengage Learning Publication date: 12 July 2001, ISBN-13: 978-0766822320

(b) Open-source software and website:

1. Screen frame making: https://www.youtube.com/watch?v=UcuTX770Z0g
2. Screen by hand cut method: https://www.youtube.com/watch?v=ND1AUJhdUZc
3. Screen prepared by direct emulsion method: https://www.youtube.com/watch?v=6gGwTUQXbEw
4. Screen prepared by indirect stencil method: https://www.youtube.com/watch?v=UaIjvfjx1v8
5. Two color screen printing: https://www.youtube.com/watch?v=v4p-rr6J4hQ
6. Process color printing by screen printing process: https://www.youtube.com/watch?v=juEZGM3Z0s

Suggested Course Practical List:

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Prepare screen frame by the hand-cut method	III	02
2	Prepare screen by direct emulsion method	III	02
3	Prepare screen by indirect emulsion method	III	02
4	Perform printing operation with screen prepared by the hand-cut method	IV	02
5	Perform printing operation with screen prepared by direct Screen method	IV	02
6	Perform printing operation with screen prepared by indirect screen method	IV	02
7	Perform screen printing operation on irregular shapes like containers, mugs, pens, etc.	IV	02
8	Perform screen printing operation on cloth.	IV	02
9	Perform screen printing operation on non-absorbent stock.	IV	02
10	Print visiting cards with the screen-printing process.	IV	02
11	Perform screen printing operation with any two specialty Color	IV	02
12	Perform screen printing operation with process color	IV	02
13	Perform screen printing operation on circuit board.	IV	02
14	Use screen printing process for spot coating.	IV	02
15	Use screen printing Process for texture coating.	IV	02
16	Identify the problem in the given job and give suitable remedies.	IV	02
	Minimum 28 Practical Exercises		**28 Hrs.**

	Equipment Name with Broad Specifications	PrO. No.
1	Screen Processing Tools Max Frame Size16” x 16” OD to 34” x 40” OD Max Exposing Area22” x 28” Power Supply220 V AC Dimension (In feet)10.5' W x 4.5' D x 7.0' H Mechanical Stretcher/Tension Meter Max. Tension Permitted16 to 20 Newton (Depending on Fabric)	1to 14

	Equipment Name with Broad Specifications	PrO. No.
	Emulsion Coating Stand & Trough Coating Trough Length with 2 End Cover 27” Screen Dryer Auto Switch-off Timer 1 to 60 minutes Exposure Exposing Lamp Metal Halide - 400 Watts Power	
2	Semi-Automatic Screen-Printing Machine Max size 10”x15” Vacuum bed 19.6”x 17.7” Vacuum bed movement for registration ±7 mm Maximum screen frame size 26”x 20” Minimum screen frame size 20”x 12” Max off contact 5 mm Max substrate thickness 3mm Screen frame thickness 1”to 1.5” Squeegee holder 17” Flood coater 19” Power consumption 220 V ac	4 to 14
3	Screen Printing Machine Table Top Max size 25”x 30” Maximum screen frame size 22”x 28” Manual machine	4 to 14
4	Screen Printing Machine for Container This Machine can print any type of Round Object like Bottles, CFL, Capacitor, Automobile Parts, Glass, Food containers, etc. 1000 impression per Hours Print up to 5" Dia. Manual type machine	9
5	Drying Rack Open type storage, Usage application: drying Material: mild steel Size: 32’’ x 42” Number of shelves: 30	4 to 14
6	Screen Dryer	1 to 4

	Equipment Name with Broad Specifications	PrO. No.
	Voltage 220 V Setting: 3 heat speed Cord length: 1.5 m	

Suggested Project List: -

1. Collect the information of mesh used for screen printing and present the report.
2. Collect the information on automation in the screen-printing field and write a report.
3. Collect the information of squeegee rubber manufacture and their different grades and write a report
4. Collect the information about dry emulsion film and write its technical specifications.
5. Collect various samples printed by screen printing and make sample book.
6. Prepare a report on technical specifications for equipment and machine used for screen printing machine.
7. Visit the screen-printing press and record a minimum of twenty process variables for the screen-printing process
8. Identify print defects relevant to the screen-printing process and write a report.
9. Identify the process control tools used for screen printing and write report.
10. Enlist hazardous chemicals used in the screen-printing industry
11. Visit different dying units and see their waste disposal method
12. See the GPCB site and prepare a report for screen printing press regarding different hazardous chemicals used and their disposal.
13. Observe the waste disposal technique of different dying units for cloth and prepare a report on it.

Suggested Activities for Students:

Students should perform following activities in group and prepare reports of about 5 pages for each activity. They should also collect/record physical evidences for their (student's) portfolio which may be useful for their placement interviews:

1. Visit screen printing press and study the workflow of it
2. Prepare a list of newer industrial applications of the screen-printing process.
3. Collect the technical brochures of the different screen-printing machines and allied products.
4. Collect the technical brochures of the different specialty inks used for screen printing from the local market

5. Observe the safety procedures at work in the screen-printing press.
6. Visit the screen-printing press and identify the quality parameter inspected during screen printing.
7. Observe the waste management approach used by the major screen-printing firm.

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