



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Printing Technology

Course / Subject Code : DI03058021

Course / Subject Name : Image Carrier

w. e. f. Academic Year:	2024-25
Semester:	3 rd
Category of the Course:	PCC

Prerequisite:	Basic knowledge of Offset Pre press and Image Carrier.
Rationale:	In Printing Industry, Offset Printing is still the leading technology of all the printing processes. This course will impart an extensive knowledge of all the elements of image carrier making for the offset process. Imposition schemes, image assembly, various methods of plate making & their appropriate application, study of useful characteristics of metals, various quality control aids as per ISO standard, etc. are the main elements of this course which will enable the student to handle all the necessary operations and equipment related to the image carrier. It gives information about print production workflow during inline operations.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Use prepress room equipment effectively.	R, U, A
02	Propose ideal conditions for prepress room environment.	R, U, A
03	Illustrate imposition layout according to binding style or product requirement.	R, U, A
04	Determine requirements and use of plate processing chemicals.	R, U, A
05	Prepare PS and CtP offset plate for printing.	R, U, A
06	Evaluate offset plate on quality control standards.	R, U, A
07	Prepare environment friendly offset plate for printing.	R, U, 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
L	T	PR		C	Theory		Tutorial / Practical	
			ESE (E)		PA(M)	PA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Printing Technology

Course / Subject Code : DI03058021

Course / Subject Name : Image Carrier

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
Unit – I Pre-Press Room Equipments.	1.1 Introduction to offset image carrier. 1.2 Study of invention of lithography. 1.3 Study of lithographic principle. 1.4 Classification of plates analog and digital. 1.5 Different steps for offset plate making. 1.6 Pre-press room equipment: Whirler, Printing down frame, Roller Coater, Auto plate processor. 1.7 Study of surface treatment such as graining, anodizing, counter etching. 1.8 Photographic positive and negatives and their ideal optical and physical requirements for plate making techniques.	06	10
Unit – II Pre-Press Room Environment.	2.1 Prepress room layout. 2.2 Environmental conditions. 2.3 Store room conditions and Storing Methods. 2.4 Dark reaction, continuing reaction, shelf life, pot life. 2.5 Room layout, ventilation, air conditioning, temperature and humidity, color, waste disposal.	04	06
Unit – III Imposition Scheme.	3.1 Imposition – definition and purpose. 3.2 Terms related with imposition schemes, page characteristics variation in imposition schemes according to binding styles i.e. center, side, loose leaf binding. 3.3 Introduction and working of plate Imposition Software.	07	14
Unit– IV Plate Processing Chemicals.	4.1 Study of chemical and physical properties. 4.2 General contents of coatings used in pre-sensitized plate and CtP lithographic plate. 4.3 Imaging requirements of plates. 4.4 Raw material used in offset image carrier making. 4.5 Study of general contents and functions of chemicals as developer, gum arabic, plate finisher and deletion.	07	10
Unit– V Pre-sensitized (PS) and Computer to Plate (CtP) plate preparation.	5.1 Study construction of different plate. 5.2 Working principle, spectral emission, characteristics and limitations of offset plates. 5.3 Light sources or illuminants such as metal halide, carbon arc mercury vapor, pulsed xenon, type of LASER. 5.4 PS positive/negative plates and its characteristics and	10	14



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Printing Technology

Course / Subject Code : DI03058021

Course / Subject Name : Image Carrier

	workflow of PS plate. 5.5 CtP plates with its characteristics and workflow. 5.6 Thermal & violet plate, requirements of input for CtP. 5.7 Use of software for CtP. 5.8 CtP machine with its construction and working. 5.9 Advantages and limitations of CtP machine.		
Unit– VI Quality Controls Aids.	6.1 Different quality control aids like: pH scale, star target, digi wedge, step wedge, plate reader. 6.2 Standardization of plate exposure. 6.3 Introduction to 12647-4 ISO standards. 6.4 Function of each quality control aids.	05	08
Unit– VII Chemistry free, Process less & Waterless Plate.	7.1 Introduction to chemistry free, process less and waterless offset printing concept. 7.2 Preparation of chemistry free with its workflow and requirements. 7.3 Preparation of process less with its workflow and requirements. 7.4 Preparation of waterless plates with its workflow and requirements. 7.5 Advantages and limitations. 7.6 Applications.	6	08
	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
26	20	24	NA	NA	NA

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. Materials in Printing Processes: L. C. Young, Focal Press, London, 1973
2. A Manual for Film Planning & Plate Making: A. L. Gatehouse, K. N. Roper, Litho Training Services Ltd. London, 1977, ISBN 13 – 978-0906091029.
3. Chemistry for the Graphic Arts: P.J. Hartsuch, Graphic Art Technical Foundation, Pittsburgh, USA, 2001, ISBN 13 – 978- 0883621493.



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Printing Technology

Course / Subject Code : DI03058021

Course / Subject Name : Image Carrier

4. Offset lithographic plate making: Robert Reed, Graphic Art Technical Foundation, Pittsburgh, USA, 1967, ISBN 13 – 978- 0318801889.
5. Print and Production Manual: Michael Barnard, Pira International, United Kingdom, 1998, ISBN 1 85802 238 X.
6. Handbook of Print Media: Prof. Dr.-Ing. habil. Helmut Kipphan, Springer-Verlag Berlin Heidelberg New York, 2001, ISBN 3-540-67326-1.

(b) Open source software and website:

1. <https://www.youtube.com/watch?v=EvYtMTDDi8Q>
2. <https://www.youtube.com/watch?v=Bbjha8xzf8>
3. <https://www.youtube.com/watch?v=DrXxZPSTiBg>
4. <https://www.youtube.com/watch?v=5KMGYPollfc>
5. <https://www.youtube.com/watch?v=jcoNwZR5b4U>
6. <https://www.youtube.com/watch?v=eXNbEQuq8oc>
7. <https://www.youtube.com/watch?v=EBpXY7aJLJo>
8. <https://www.youtube.com/watch?v=7snZ04E5F6o>
9. <https://www.youtube.com/watch?v=0XFXEdXvGFQ>
10. <https://www.youtube.com/watch?v=4W70YBErBfU>
11. <https://www.youtube.com/watch?v=ZgY4w9e2GRQ>
12. <https://www.youtube.com/watch?v=gas50ks9X6o>
13. <https://www.youtube.com/watch?v=qf6VGMQdQFI>
14. <https://www.youtube.com/watch?v=8oLq3vQLIZE>
15. https://www.youtube.com/watch?v=TeJ_STTfBsI
16. <https://www.youtube.com/watch?v=KENIyBWNhyk>
17. <https://www.youtube.com/watch?v=IDGJkAKFnGI>
18. <https://www.youtube.com/watch?v=lNn1fCvrYp4>
19. <https://www.youtube.com/watch?v=w4PSGcCOS6s>
20. <https://www.youtube.com/watch?v=jvmW13AXwAg>
21. <https://www.youtube.com/watch?v=d90n0HeeR7Y>
22. https://www.youtube.com/watch?v=2r3HN_cfRQM
23. <https://www.youtube.com/watch?v=Y3bOjHaOt2k>
24. <https://www.youtube.com/watch?v=jOKeL1dDZCQ>
25. <https://www.youtube.com/watch?v=qp8zyWTy6XA>
26. <https://www.youtube.com/watch?v=d7BdmfWTxSE>



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Printing Technology

Course / Subject Code : DI03058021

Course / Subject Name : Image Carrier

Suggested Course Practical List:

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Identify working principle of whirler, printing down frame, step-repeat machines.	I	2
2	Suggest ideal storage conditions of dark reaction, continuous reaction, shelf life, pot life.	I	2
3	Identify working of different section of auto plate processor.	I	2
4	Calculate shelf life, and pot life induced exposure time variation.	I	2
5	Preparation of plate developing solution for manual and auto plate processor.	I	2
6	Plan plate making room layout w.r.t. ventilation, flooring, air conditions, temperature & humidity.	II	2
7	Draw full sheet work imposition scheme - work and turn and work and tumble for 8 page section.	III	2
8	Draw full sheet work imposition scheme – work and turn and work and tumble for 16 page section.	III	2
9	Draw half sheet work layout for imposition scheme work and turn and work and tumble for 8 page section.	III	2
10	Draw half sheet work layout for imposition scheme work and turn and work and tumble for 16 page section.	III	2
11	Prepare dummy for 32 pages book by sheet work layout imposition scheme work and turn and tumble for 8 page section for center and side binding.	III	2
12	Prepare dummy for 64 pages book by sheet work layout imposition scheme work and turn and tumble for 16 page section for center and side binding.	III	2
13	Prepare dummy for 32 pages book by half sheet work layout imposition scheme work and turn and tumble for 8 page section for center and side binding.	III	2
14	Prepare dummy for 64 pages book by half sheet work layout imposition scheme work and turn and tumble for 16 page section for center and side binding.	III	2
15	Preparation of wipe on plate for single color offset printing.	IV	2
16	Preparation of positive working plate for printing of four color job.	IV	2
17	Preparation of negative working plate for printing of four color job and sequencing of colors.	IV	2
18	Prepare CtP plates for four color printing job.	V	2



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Printing Technology

Course / Subject Code : DI03058021

Course / Subject Name : Image Carrier

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
19	Preparation of CtP plate for printing of packaging carton with jig punch.	I, V	2
20	Evaluate CtP plates by changing developing parameter of auto plate processor.	I, V	2
21	Preparation of plate for printing of oblong books having head to head binding style.	I, V	2
22	Compare offset plate quality with ISO Standard using Quality control tool as digi wedge, step wedge, dot gain scale, screen angle, screen ruling, print control bar.	VI	2
23	Examination of plate results for time variation in plate exposing and plate preparation.	VI	2
24	Compare construction & working of waterless plate, chemistry free plate and process less plate with PS plate.	VII	2
25	Identification causes and remedies for problems occurred during chemistry free, process less and waterless plate preparation.	VII	2
Minimum 14 Practical Exercises			28 Hrs.

Suggested Project List: -

1. Collect the information of various CtP machines setup installed in local area/ city.
2. Enlist various software used for the book imposition and give details of workflow of software.
3. Collect product brochures of different developer, plate cleaner, gum and compare their characteristics, prizes, ingredients and application.
4. Collect printed samples of different imposition schemes and write down its advantages and disadvantages.
5. Prepare dummy of actual job performed on printing press.
6. Enlist all the equipment used in prepress room along with photograph and parallel terminology used by local workers.
7. Collect information about quality standard followed in local press setups.
8. Collect information about latest software and machines used for offset plate preparation.
9. Enlist raw material used in printing press (plate making dept.) along with costing and procurement process.
10. Collect brochure of different CtP plates and compare their prizes, application run length etc.
11. Prepare a report on safety precautions should be followed in pre-press room.



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Printing Technology

Course / Subject Code : DI03058021

Course / Subject Name : Image Carrier

List of Laboratory/Learning Resources Required:

S. No.	Equipment Name with Broad Specifications	PrO.No.
1	Drawing board and drawing equipment.	1-5,7
2	Imposition and paste up table: <ul style="list-style-type: none">● Light: yes● Size: 25 * 36● Weight: approx 100kg	1-8
3	Printing down frame: <ul style="list-style-type: none">● Weight : 150 kg● Voltage: 220V● Light source: Metal halide● Automatic grade: Automatic● Power: 1-3kw, 3-6kw● Driven type: electric	9,10,16,17,18
4	Computer (Windows 10 Pro, Intel® Core™i5, RAM 8GB, 64-bit operating system)	1-5,19-21, 25
5	Imposition software: <ul style="list-style-type: none">● Version: launched 2022● OS : compatible with windows 10	1-5,19-21, 25
6	CTP <ul style="list-style-type: none">● Type: external drum● Plate formats supported: Max 1130 X 920 MM, Min 400 x 300 MM● Plate type: thermal plates● Electrical requirements: single phase : 200 - 240V;● Max power (peak value) : 4 KW● Resolution: 2400 dpi● Weight: 900 Kg● Dimensions (L x W x H): 1050 X 2530 X 950 mm	19-21,25
7	Auto plate processor: <ul style="list-style-type: none">● Plate types: thermal and conventional plates● Plate width: 850 mm (33.5") max● Plate length: 274 mm (10.8") min● Plate thickness: 0.15-0.3 mm (0.006-0.012")● Processing speed : 40-140 cm/min (15.7-55.1"/min) Consumption <ul style="list-style-type: none">● Tank capacity developer: 22 l (5.8 US gal)● Temperature developer: 20-34 °C (68-93 °F)● Water draining: 16 l/min (4.2 US gal/min)● Water recirculation: 0.2 l/m² (0.8 US gal/m²)	9,10,16,17,18, 19-21,25



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Printing Technology

Course / Subject Code : DI03058021

Course / Subject Name : Image Carrier

S. No.	Equipment Name with Broad Specifications	PrO.No.
	<ul style="list-style-type: none">● Power stand-by: 0.06 kW (200 BTU/hour)● Power operate: 1.8 kW (6,000 BTU/hour)● General● Dimensions: (LxWxH) 115 x 126 x 101-110 cm● Weight: 235 kg (518 lbs)	
8	<p>Plate Reader:</p> <ul style="list-style-type: none">● Power supply: power source 2 Batteries 1.5 V Rechargeable● Battery life: (measurements) 30,000 (typ.) > 2'000 (typ.)● Data interface: interface serial (115'200 baud) USB2.0● Measurement technology: Ring illumination X X● Illumination colors: R R, G, B R, G, B, RGB IR, UV● Screen ruling range : (AM) 26 – 147 l/cm 30 – 150 l/cm 65 – 380 lpi 75 – 380 lpi● Dot size range (FM) 10 μm – 50 μm 10 μm – 70 μm● Repeatability \pm 0.5% (typ.) \pm 0.5% (typ.)● Measurement time 3 sec (typ.) 3 sec. (typ.)● Mechanical data● Dimensions (H x W x L) 4.8 x 7.3 x 14.5 cm 9 x 9 x 20 cm● 1.9 x 2.9 x 5.7 in 3.8 x 3.8 x 7.9 in● Weight 400 g / 14 oz 850 g / 30 oz	9,10,16,17,18, 19-21,25

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. Prepare journals based on practical performed in laboratory.
2. Give seminar on relevant topic.
3. Undertake micro-projects.
4. Visit Press setups in local area to learn workflow of production.
5. Visit Press setups in local area to learn workflow of commercial job production.
6. Visit Press setups in local area to learn workflow of publication job production.
7. Visit Press setups in local area to learn workflow of packaging job production.
8. Visit Press setups in local area to learn workflow of label job production.
9. Visit Press setups in local area to learn workflow of commercial job production.

* * * * *