



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Printing Technology

Subject Code : DI04058021

Subject Name : Advance Offset Printing

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

Prerequisite:	Basic knowledge of conventional printing process.
Rationale:	Offset Printing technology is developing rapidly and offset printing machines of different size, capacity and type are available in market to cater to the needs of the different types of customers. It has therefore become important for every printing engineer to develop competency in offset printing and specially to update knowledge about various advances in Sheet fed and Web fed offset printing technology. The purpose of this course is therefore to enhance the knowledge of existing and new developments on multi technology integration and develop level of skill in offset printing for enhancing performance.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Identify various parts of web offset machine	R, A, E
02	Set various parameter of infeed unit according to various substrates	R, A, E
03	Control tension and registration of web during printing	R, A, E
04	Select different ancillary equipments as per job requirement	R, A, E
05	Set various parameters for inline operation according to job	R, A, E
06	Identify various parts of metal decoration press	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
L	T	PR		C	Theory		Tutorial / Practical	
			ESE(E)		PA(M)	PA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150



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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
Unit – I Introduction to web offset	1.1 Introduction of Web Offset Process 1.2 Importance of Web Offset Process 1.3 Types and Different Configuration of Web Offset 1.4 Different Machine Configuration and their job Suitability. 1.5 Differentiate between Web Offset and Sheet fed Offset	05	14
Unit – II Infeed unit	2.1 Types of reel stands: single, multiple, revolving, reel stand location: inline, perpendicular, basement 2.2 Locking- expanding shaft, tilt lock, chuck systems. 2.3 Splicers and their Construction : manual and automatic splicers, need of splicing, splicing types- Flying splicer (match speed), zero speed - festoon working, application 2.4 Turning web: angle bar, turner bar, web turnovers, bay windows 2.5 Web guide roller: sensing, canting rollers, bar guides 2.6 Straighten web : sharp edge bars, round bars, tension rollers, air turbulence, crowned rollers, bowed rollers 2.7 Web cleaning brushes, surface treatment, static charge elimination	07	18
Unit – III Web Tension control and registering	3.1 Web tension and its factors: surface speed, draw, slip, paper and modulus of elasticity and dryer 3.2 Dancer roller, infeed metering roller, brakes and detectors, reel motors, running bands, transducers 3.3 Different web tension measuring methods: subjective assessment, tension rollers, portable tension meters, high sensitivity sensors 3.4 Influence of the reel brake 3.5 Influence of the printing units 3.6 Drying systems and outfeed units 3.7 Define registration, registration marks, color register, relative to print length and relative to print width, controlling and fanout 3.8 Web control: side lay, cut off, web to web and ribbon to ribbon registration, 3.9 Registration methods: register rollers, eccentric rollers, displacing units, differential gearing, 3.10 Stroboscope, oscillating mirror, video Viewers 3.11 Registration marks 3.12 One mark registration	10	22



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	3.13 Print to print registration		
Unit – IV Dryers, chillers and ancillary operations.	4.1 Need of dryers and its Importance 4.2 Types of dryers 4.3 Need of chill rollers and its Importance 4.4 Types of chill rollers 4.5 Introduction of ancillary operation: 4.6 remote control console, plate scanner, scanning densitometer, closed loop system, web pre-conditioner, automatic level controller, ink pumping system, water cooled ink oscillators, fountain solution recirculation system, fountain solution mixtures, refrigerating fountain solution, automatic blanket washer, side lay sensors, web break detectors, remoisturizers, coaters, anti static devices, and cut off controls, 4.7 Web to web register: mechanical and electrical color register, compensators, viscosity control, ink mixing 4.8 Introduction of C. P. C technology 4.9 Introduction of different workflow in offset 4.10 Sustainable developments: newer inks, LED drying methods, time saving workflow, newer fountain solution, energy savings newer models	10	22
Unit– V Inline Operation	5.1 Folding principles, folding and its type 5.2 Mechanics of folding, folding adjustments and maintenance 5.3 Different accessories for folding and its control 5.4 Auxiliary folders: prefolders, plow folders, insert folders 5.5 Slitting, Trimming, cutting, variable rotary cutters, sheeters 5.6 Gluers: paster wheels, remoistenable pattern gluers, segmented gluers, envelope pattern gluers, spot gluers, backbone gluers 5.7 Pattern perforation, perforators 5.8 Imprinting 5.9 Coating 5.10 Bundling and Strapping	7	14
Unit– VI Metal Decoration Press	6.1 Introduction to metal decoration press and its uses 6.2 Construction and working of metal decoration press 6.3 Printing procedure for metal decoration press 6.4 Pre and post press operation of metal decoration press 6.5 Characteristics of ink required for metal decorating press 6.6 Different sustainable development in metal decoration press	6	10
	Total	45	100



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Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
27	53	20	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. Web Offset Press Operating-Daniel G. Wilson - Graphic Arts Technical Foundation;- 5 edition (March 10, 2003), ISBN-13: 978-0883622902
2. Web Control - W R Durant - Publisher: Northwood Publication Ltd. - Published in October 1977 ISBN: 719826098
3. The Print and Production Manual - Sean Smyth - Pira International Limited - Randalls Road, Leatherhead - Published in 2008, ISBN-13 1858025148-978 :
4. The Complete Book on Printing Technology - NIIR Board Publisher Asia Pacific Business : (2003 January 1) .Press Inc - ISBN-13 8178330525-978 :
5. Litho Offset Press Operating - Charles W Latham - Graphic Arts Technical Foundation; - Revised edition (1967) ASIN -B0007FKTSQ

(b) Open source software and website:

- a) <https://www.youtube.com/watch?v=6z6Shvs9n5s> – web offset printing
- b) <https://www.youtube.com/watch?v=U5tsuAEkxaw> – CI press configuration
- c) https://www.youtube.com/watch?v=spXt32dMA_I&t=14s – web offset printing
- d) <https://www.youtube.com/watch?v=PJ-yGd2NvrU> – zero speed splicing
- e) https://www.youtube.com/watch?v=6jsd_EfVzrQ – flying splicer
- f) <https://www.youtube.com/watch?v=qwG-zoC5kJ4> – web tension control
- g) <https://www.youtube.com/watch?v=h3gRzY4lB-o> – web tension control
- h) https://www.youtube.com/watch?v=4isc_BYxitQ – Dancer Roller
- i) <https://www.youtube.com/watch?v=BpRVUmWSM4w> – web direction change
- j) <https://www.youtube.com/watch?v=9lyx157opVo> – stroboscopes
- k) <https://www.youtube.com/watch?v=GkjqaaxBYZQ> – side lay sensor
- l) <https://www.youtube.com/shorts/ioewV-u0ca4> - refrigerated dampening system
- m) <https://www.youtube.com/watch?v=znTVGfa2-fQ> – folding unit
- n) <http://printwiki.org/> - glossary
- o) <http://agpcptech.weebly.com/> - notes



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Suggested Course Practical List:

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1.	Identify and elaborate working of different parts of web offset machine	1	2*
2.	Identify and elaborate working of different configuration of web offset machine	1	2*
3.	Perform infeed unit settings for printing on web offset machine	2	2*
4.	Perform dampening unit setting on web offset machine	3	2
5.	Perform Inking unit settings according to construction of units on web fed machine	3	2*
6.	Check ink roller setting of web offset machine	3	2*
7.	Perform plate mounting operation on web offset machine	3	2*
8.	Perform blanket changeover operation on web offset machine	3	2*
9.	Perform outfeed unit setting of web offset machine	3	2*
10.	Perform roller cleaning, blanket cleaning and plate cleaning operation with press consumable chemicals	4	2
11.	Print single color job web offset machine	4	2*
12.	Print two color job on web offset machine	4	2*
13.	Print four color job on web offset machine	4	2
14.	Perform folder setting according to type of fold on web offset machine	5	2*
15.	Perform web offset machine calibration	5	2
16.	Perform maintenance schedule for web offset machine	5	2*
17.	Perform inspection schedule of web offset machine	5	2*
18.	Resolve problems occur during printing on web offset machine	5	2*

Major Equipment/Instruments Required:

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	Single color web offset machine Maximum Paper Size : 380 x 508 mm Minimum Paper Size : 125 x 175 mm Maximum Printing Area : 357 x 485 mm Paper Thickness : 30 to 150 gsm Blanket : 4 ply rubber blanket, 1.9 mm thick gripper margin on Paper : 8 to 10 mm gripper margin on Plate : 32 mm (1.25") Gripper Bite : 4 mm plate thickness : 0.05 to 0.2 mm direct offset master thickness : 100 micron	1 to 18



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S. No.	Equipment Name with Broad Specifications	PrO. No.
	Inking unit : 9 rollers including 2 oscillators, 2 form rollers Dampening unit : 4 rollers including 1 oscillator, 1 form roller Main drive motor : 1 Hp 230 V AC three phase (connectable to single phase power supply) Compressor pump motor : 1 Hp 230 V AC single phase Speed : 1500 to 5000 iph Physical Dimensions (L x W x H) : 1420 x 1165 x 1300 mm Gross Weight : 1250 Kg approx. (packed)	
2	Ink proofing kit Tape width: 20-40 mm Usage: drawdown Model: manual Printing width : 50 mm Printing length: 110 mm Roll diameter: 35 mm Roll length : 50 mm	05,06,07, 11,12,13,14
3	Pressroom tools – plate punch, blanket clamp, tool box	1 to 18
4	Printer Laser jet black and white, print resolution: 600 x 600 DPI, print speed: 24 PPM, print size: A3, A4	12,13,14
5	Fuser Size: A3 Model: semi-automatic Material: metal Weight: 110 Kg	12,13,14
6	Vernier Calliper Range: 0-100 mm Depth Bar: 1.9 mm Max. permissible error E MPE: ± 0.05 mm Max. permissible error S MPE: ± 0.07 mm Mass: app. 128g With upper locking screw: Yes	3-11
7	Micrometer Screw Gauge Range: 0-1 Inch Accuracy: ± 0.0001 Inch Mass: app. 175g	3-11



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S. No.	Equipment Name with Broad Specifications	PrO. No.
8	Durometer – Rubber Hardness Series A Type: handheld dial durometer Range: 10 to 90 Dial reading: 10-90 Indenter shape: blunt taper Depth: 1.3 in Height: 7.4 in Width: 2.3 in Tip Angle: 35 degrees ASTM D 2240, DIN 53 505, ISO 7619, ISO868, JIS K 6253, JIS K 7215	5,6,7,11

Suggested Project List: -

- Collect 5 samples printed by web offset process and prepare a report.
- Collect samples of different folding styles used in web offset and prepare report on it.
- Prepare a short report on Indian publication printing industry.
- Visit web offset press and prepare their product portfolio.
- Collect the information of web-based printing industries and list their products also prepare report on it.
- Enlist printing and converting machine manufacturer along with technical specifications.
- Identify the web tension control processes and components employed therein for any two printing and converting web machines.
- Record maintenance system used for web handing units of web printing machine.
- Visit a fabrication unit and list steps in manufacturing idle and spreader rollers.
- List technical specifications about the electrical motors used in web control on printing and converting machines.
- Survey local web printing and converting units to collect data on time spent in stoppages due to web breaks, roll and job changeovers.
- Visit the local web printing presses and tabulate web control process wise data of substrates and print speed range.
- Visit web printing, laminating, slitting and pouch-making units to observe procedure followed in handling telescopic rolls.
- List the physical properties of paper and web materials important from web tension control perspective.
- Collect report of handling print waste with figures, tables and comparative charts and strategies used. Compile as a report.
- Collect information of different presses which are uses different sustainable development.
- Collect information of go green concept in printing industry. Prepare a report



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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:

- a) Prepare specification of web offset machine
- b) Collect specifications, prices, terms and conditions along with sources of supply of different web offset products
- c) Prepare list of national and regional printing companies covering providing services to different sectors.
- d) Prepare list of web offset manufactures along with details of their products.
- e) Prepare list of service provider to web offset along with details of their products.
- f) Collect samples with specifications and related details of different finishing process.
- g) Prepare a flowchart of different operation done in newspaper printing press.
- h) Prepare a hierarchy chart of one print organization.
- i) Give a seminar on any web offset printing relevant topic.
- j) Undertake a market survey of different web offset printing process and prepare a report.
- k) Prepare showcase portfolios of different printed samples.
- l) Prepare journals based on practical performed in laboratory.

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