

PDA – 106 INTRODUCTION TO PRINTING & PACKAGING TECHNOLOGY

Course Title	Introduction to Printing & Packaging Technology	Course Code	PDA - 106
Year	I	Course Group	Core
Teaching Scheme in Minutes (L: T: P)	120:30:0	Credits	3
Methodology	Lecture + Tutorial	Total Contact Hours	150
CIE	60 Marks	Year End Exam (YEE)	40 Marks

PREREQUISITES: Basic knowledge of English and Communication Skills

Course Outcomes (COs):

CO 1	Describe history, evolution & fundamentals of printing processes
CO 2	Explain workflow: pre-media, pre-press, film, plate making, post-press
CO 3	Identify/apply suitable printing methods for different surfaces
CO 4	Analyze applications of printing techniques in industries & recommend
CO 5	Trace historical development & outline key functions/components of packaging
CO 6	Evaluate packaging design principles, materials, sustainability issues

COURSE CONTENT:

Unit 1: EVOLUTION OF PRINTING

Duration: 25 HOURS

History of printing -Invention of movable type -Lithography -Offset Printing-Gravure-Flexography- screen printing -Digital Printing -Hybrid printing- Printing Today -Computer-to “Technology in the Age of the Information Highway

Unit 2: PRINTING PROCESSES

Duration: 25 HOURS

Pre-media - Pre-press -Pre press Areas (Composition, reproduction,photo composition)-Film reproduction -reproduction technology -image assembly and plate making - Digital Pre press -Press (Printing)-Post press/finishing -Terms Relating to Printing Processes

Unit 3: APPLICATIONS OF PRINTING PROCESSES

Duration: 25 HOURS

Suitability of printing processes to different classes of work-Letterpress Printing-Offset printingGravurePrinting- Printing-Flexography Printing- Screen Printing-Posters and Graphics Printing in Short Print Runs- Digital Printing

Unit 4: PRINTING SURFACES

Duration: 25 HOURS

Types of Printing Surfaces-Printing Methods and Surfaces- Factors to Consider When Choosing a Printing Surface- Introduction to Surface preparation for Offset Printing- Printing Plates- Introduction to Chemical etching- Electronic engraving, Laser engraving

Unit 5: PACKAGING & IT'S COMPONENTS

Duration: 25 HOURS

History of packaging - Historical events in the Development of the packaging- Chronological developments- Key Functions of Packaging- Types of Packaging- Various components of packaging

Unit 6: PACKAGING CONCEPT

Duration: 25 HOURS

Definition of packaging- Functions of packaging- Advantages of packaging - Disadvantages of packaging - Packaging criteria - Role of packaging technologies and functions 3 P concept (Product- Package-Process).

SPECIFIC LEARNING OUTCOMES:

CO 1: Describe history, evolution & fundamentals of printing processes

1. Describe the history and origin of printing.
2. Explain the invention and impact of movable type printing by Johannes Gutenberg on global communication and education.
3. What is the principles and development of lithographic printing and its influence on modern print techniques.
4. Discuss the evolution of offset printing, including its working mechanism and industrial applications.
5. Compare various printing processes, such as gravure, flexography, screen printing, and their specific use cases.
6. Identify the features and advantages of digital printing in the context of short-run and on-demand printing.
7. Explain the concept and benefits of hybrid printing that combines traditional and digital printing technologies.
8. Summarize the current trends and technologies in the printing industry.
9. Discuss the transformation of printing in the digital era.
10. Analyze the significance of printing technology in the Information Age

CO 2: Explain workflow: pre-media, pre-press, film, plate making, post-press

1. Define the stages of the printing workflow
2. Explain the concept and role of pre-media in preparing digital content for printing.
3. Describe various pre-press operations.
4. Discuss film reproduction techniques and their relevance in traditional and digital printing workflows.

5. Outline the fundamentals of reproduction technology, including tone reproduction and color separation.
6. Demonstrate understanding of image assembly and plate-making processes, including manual and digital methods.
7. Differentiate between conventional and digital pre-press systems, highlighting advantages and limitations.
8. Explain the press (printing) stage.
9. Describe post-press and finishing techniques
10. Interpret technical terms related to various printing processes

CO 3: Identify/apply suitable printing methods for different surfaces

1. Identify and compare the major printing processes and their suitability for various types of print jobs.
2. Explain the application of letterpress printing in packaging, labels, and specialty jobs.
3. Describe the role of offset printing in commercial, book, newspaper, and magazine production.
4. Discuss gravure printing and its use in high-volume printing, such as packaging, wallpapers, and decorative materials.
5. Explain the principles and applications of flexographic printing.
6. Describe the use of screen printing for textiles, signage, glass, and industrial products.
7. Assess the effectiveness of digital printing for short print runs, customization, and fastturnaround jobs.
8. Evaluate the suitability of printing techniques based on substrate, print run, image quality, and budget.
9. Illustrate real-world examples where specific printing methods are used in industries like publishing, advertising, and packaging.
10. Recommend appropriate printing methods for given products

CO 4: Analyze applications of printing techniques in industries & recommend

1. Identify different types of printing surfaces.
2. Match suitable printing methods with respective surfaces, considering ink adhesion, durability, and finish.
3. List and explain the factors influencing the choice of a printing surface, such as texture, porosity, ink absorption, and intended use.
4. Describe the role of surface preparation in offset printing
5. Explain the types and characteristics of printing plates
6. Discuss the process of chemical etching, including its role in gravure and intaglio plate preparation.
7. Differentiate between electronic engraving and laser engraving, focusing on accuracy, speed, and application.

8. Demonstrate understanding of surface treatment methods that enhance print quality and durability.
9. Evaluate how surface properties affect print output
10. Select appropriate surface and preparation techniques for different print jobs based on the print method and product requirements.

CO 5: Trace historical development & outline key functions/components of packaging

1. Trace the history of packaging, highlighting major historical events and innovations in packaging evolution.
2. Describe the chronological development of packaging materials, from natural materials to modern synthetic options.
3. Identify the key milestones in packaging technology.
4. Explain the core functions of packaging.
5. Differentiate between various types of packaging, including primary, secondary, and tertiary packaging.
6. Classify packaging types based on form and material, such as rigid, semi-rigid, and flexible packaging.
7. List and describe the major components of packaging
8. Analyze how packaging components contribute to product safety and integrity during handling, storage, and distribution.
9. Discuss the importance of packaging in branding and marketing, and its influence on consumer behavior.
10. Assess the sustainability and environmental impact of various packaging materials and components Demonstrate cloud storage usage

CO 6: Evaluate packaging design principles, materials, sustainability issues

1. Define packaging and explain its relevance in product protection, marketing, and distribution.
2. List and explain the core functions of packaging, including containment, protection, information, convenience, and branding.
3. Identify the key advantages of packaging.
4. Evaluate the disadvantages of packaging.
5. Explain packaging criteria such as material selection, product nature, shelf life, logistics, and regulatory compliance.
6. Discuss the role of packaging technologies, including automation, smart packaging, and material innovations.
7. Illustrate the application of the 3P concept (Product–Package–Process) in designing an effective packaging system.
8. Analyze the interdependence between product characteristics and packaging design for efficient packaging solutions.
9. Examine how packaging process selection impacts cost, efficiency, and product integrity.

10. Recommend packaging strategies based on product type, usage conditions, and consumer expectations

SUGGESTED STUDENT ACTIVITIES:

1. Prepare a Timeline of Printing History – Create a chart showing major milestones (Movable type, Lithography, Offset, Digital printing).
2. Identify Printing Samples – Collect and categorize samples of offset, gravure, flexography, and screen-printed materials.
3. Visit a Printing Press or Packaging Unit – Observe pre-press, press, and post-press operations, and prepare a short report.
4. Demonstration of Pre-Press Workflow – Practice image assembly, plate making, and digital prepress operations using design software.
5. Surface Selection Activity – Compare different printing surfaces (paper, plastic, metal) and discuss which printing process suits each.
6. Mini Project on Packaging Types – Collect examples of primary, secondary, and tertiary packaging and present their functions.
7. Cost Comparison Study – Compare the cost-effectiveness of digital vs. offset printing for short and long print runs.
8. Design a Package – Create a conceptual packaging design considering 3P (Product–Pack–age–Process).
9. Poster Presentation – Make a poster explaining advantages and disadvantages of various packaging materials.
10. Group Debate / Discussion – Discuss the impact of digital printing on traditional printing industry and future trends

RECOMMENDED BOOKS:

1. Introduction to Printing Technology – N. Sankaraiah
2. Modern Printing Technology – M.Y. Lokeshwar
3. Handbook of Print Media – Helmut Kipphan
4. Packaging Technology: Fundamentals, Materials and Processes – Anne Emblem & Henry Emblem
5. Packaging Technology and Engineering – Walter Soroka
6. Principles of Graphic and Printing Communication – N. Santosh Kumar

E-LEARNING LINKS:

1. Kipphan, Helmut (2001). Hand book of print media: technologies and production methods (Illustrated.). Springer.pp.130–144.ISBN3-540 67326-1.
2. <http://nptel.ac.in>
3. www.iip.in.com
4. <https://pcrri.org>

CO - PO MAPPING MATRIX

COURSE OUTCOME		CL	Linked PO	Teaching Periods
CO 1	Describe history, evolution & fundamentals of printing processes	R/U	1 & 2	20
CO 2	Explain workflow: pre-media, pre- press, film, plate making, post-press	U/A	1, 2, 3 & 5	30
CO 3	Identify/apply suitable printing methods for different surfaces	U/A	1, 2, 3, 5 & 6	30
CO 4	Analyze applications of printing techniques in industries & recommend	U/A	1, 2, 3 & 4	20
CO 5	Trace historical development & outline key functions/components of packaging	R/U	1, 2 & 6	20
CO 6	Evaluate packaging design principles, materials, sustainability issues	U/A	1, 2, 3, 5, 6 & 7	30

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management Experimentation and Testing	Lifelong Learning
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	3	2					
CO 2	2	3	2		2		
CO 3	2	2	3		2	2	
CO 4	2	3	3	2			
CO 5	2	2				3	
CO 6	2	2	2		2	3	2

EXAMINATION PATTERN:

MID - I Exam					
SL. NO.	Unit No.	R	U	A	Remarks
01	Unit -I	1, 2	5 (a) 5 (b)	7 (a) 7 (b)	
02	Unit - II	3, 4	6 (a) 6 (b)	8 (a) 8 (b)	
Total Questions		4	4	4	

MID - II Exam					
SL. NO.	Unit No.	R	U	A	Remarks
01	Unit -III	1, 2	5 (a) 5 (b)	7 (a) 7 (b)	
02	Unit - IV	3, 4	6 (a) 6 (b)	8 (a) 8 (b)	
Total Questions		4	4	4	

YEAR END EXAM							
SL. NO.	Unit No.	Question to be set for SEE					Remarks
		R		U	A		
01	Unit - I	4	1		9(a)	13 (a)	
02	Unit - II						
03	Unit - III		2		10(a)	14 (a)	
04	Unit - IV						
05	Unit- V		3	5,6	9 (b)	13 (b)	
					11 (a)	15 (a)	
					11 (b)	15 (b)	
06	Unit- VI		7,8	10 (b)	14 (b)		
				12 (a)	16 (a)		
				12 (b)	16 (b)		
Total Questions		8		8	8		

Legend	Remembering (R)	1 Mark
	Understanding (U)	1 Mark
	Application (A)	4 Mark

CIE - MODEL PAPER
DIPLOMA IN PRINTING & DATA ANALYTICS
MID – I

Sub Name: Introduction to Printing & Packaging Technology
Sub Code: PDA – 106

Time: 1 hours

Max.Marks: 20

PART - A

4 X 1 = 4 Marks

Answer all the Questions. Each Question carries one mark and answer should not exceed ¼ pages.

1. Who invented movable type printing?
2. Name two printing processes.
3. Define lithography.
4. What is digital printing?

PART - B

2 X 3 = 6 Marks

Answer the following, each question carries 3 marks and answer should not exceed 1 page

5. (a) Explain the evolution of offset printing.

OR

(b) Describe gravure and flexography printing with examples.

6. (a) What are the stages of pre-press operations?

OR

(b) Explain digital pre-press and its advantages.

PART – C

2 X 5 = 10 Marks

Answer the following each question carries 5 marks and answer should not exceed 2 pages.

7. (a) Discuss the principles and applications of screen printing

OR

(b) Explain the concept and benefits of hybrid printing.

8. (a) Describe image assembly and plate making

OR

(b) Explain post-press and finishing techniques

CIE - MODEL PAPER
DIPLOMA IN PRINTING & DATA ANALYTICS
MID – II

Sub Name: Introduction to Printing & Packaging Technology
Sub Code: PDA – 106

Time: 1 hours

Max.Marks: 20

PART - A

4 X 1 = 4 Marks

Answer all the Questions. Each Question carries one mark and answer should not exceed ¼ pages.

1. Define Letterpress printing.
2. What is a printing surface?
3. Write one application of Screen Printing.
4. Define Printing Plate

PART - B

2 X 3 = 6 Marks

Answer the following, each question carries 3 marks and answer should not exceed 1 page

5. (a) Explain applications of Offset printing
OR
(b) Discuss the applications of Flexographic printing.
6. (a) Explain factors to consider while choosing a printing surface
OR
(b) Describe the process of chemical etching in printing.

PART – C

2 X 5 = 10 Marks

Answer the following each question carries 5 marks and answer should not exceed 2 pages.

7. (a) Explain suitability of different printing processes for various classes of work.
OR
(b) Describe in detail Digital Printing and its applications
8. (a) Explain electronic engraving and laser engraving with examples
OR
(b) Discuss the role of surface preparation in Offset printing

YEE - MODEL PAPER
DIPLOMA IN PRINTING & DATA ANALYTICS
YEAR END EXAM
Sub Name: Introduction to Printing & Packaging Technology
Sub Code: PDA – 106

Time: 2 hours

Max.Marks: 40

PART - A

8 X 1 = 8 Marks

Answer all the Questions. Each Question carries one mark and answer should not exceed ¼ pages.

1. Describe the history and origin of printing.
2. Define the stages of the printing workflow
3. Explain the application of letterpress printing in packaging, labels, and specialty jobs.
4. Identify different types of printing surfaces.
5. Trace the history of packaging, highlighting major historical events and innovations in packaging evolution.
6. Describe the chronological development of packaging materials, from natural materials to modern synthetic options.
7. Define packaging and explain its relevance in product protection, marketing, and distribution.
8. List and explain the core functions of packaging, including containment, protection, information, convenience, and branding.

PART - B

4 X 3 = 12 Marks

Answer the following, each question carries 3 marks and answer should not exceed 1 page

9. a.) What is the principles and development of lithographic printing and its influence on modern print techniques
OR
b.) Describe various pre-press operations
10. a.) Discuss gravure printing and its use in high-volume printing, such as packaging, wall papers, and decorative materials
OR
b.) List and explain the factors influencing the choice of a printing surface, such as texture, porosity, ink absorption, and intended use
11. (a) Identify the key milestones in packaging technology.
OR
(b) Explain the core functions of packaging
12. (a) Identify the key advantages of packaging
OR
(b) Evaluate the disadvantages of packaging

PART – C

4 X 5 = 20 Marks

Answer the following each question carries 5 marks and answer should not exceed 2 pages.

13. (a) Compare various printing processes, such as gravure, flexography, screen printing, and their specific use cases.
OR
(b) Outline the fundamentals of reproduction technology, including tone reproduction and color separation
14. (a) Describe the use of screen printing for textiles, signage, glass, and industrial products.
OR
(b) Explain the types and characteristics of printing plates
15. (a) Differentiate between various types of packaging, including primary, secondary, and tertiary packaging
OR
(b) Classify packaging types based on form and material, such as rigid, semi-rigid, and flexible packaging
16. (a) Explain packaging criteria such as material selection, product nature, shelf life, logistics, and regulatory compliance
OR
(b) Discuss the role of packaging technologies, including automation, smart packaging, and material innovations