

Curriculum

Three Year (Six Semesters) Diploma Course In

PRINTING TECHNOLOGY

3rd Semester to 6th Semester



Prepared by:

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PREFACE

An important issue generally debated amongst the planners and educators world over is how technical education can contribute to sustainable development of the societies struggling hard to come in the same bracket as that of the developed nations. The rapid industrialization and globalization has created an environment for free flow of information and technology through fast and efficient means. This has led to shrinking of the world, bringing people from different culture and environment together and giving rise to the concept of world turning into a global village. In India, a shift has taken place from the forgettable years of closed economy to knowledge based and open economy in the last few decades. In order to cope with the challenges of handling new technologies, materials and methods, we have to develop human resources having appropriate professional knowledge, skills and attitude. Technical education system is one of the significant components of the human resource development and has grown phenomenally during all these years. Now it is time to consolidate and infuse quality aspect through developing human resources, in the delivery system. Polytechnics play an important role in meeting the requirements of trained technical manpower for industries and field organizations.

In order to meet the requirements of future technical manpower, we will have to revamp our existing technical education system and one of the most important requirements is to develop outcome-based curricula of diploma programmes. The curricula for diploma programmes have been revised by adopting time-tested and nationally acclaimed scientific method, laying emphasis on the identification of learning outcomes of diploma programme.

The real success of the diploma programme depends upon its effective implementation. However best the curriculum document is designed, if that is not implemented properly, the output will not be as expected. In addition to acquisition of appropriate physical resources, the availability of motivated, competent and qualified faculty is essential for effective implementation of the curricula.

It is expected of the polytechnics to carry out job market research on a continuous basis to identify the new skill requirements, reduce or remove outdated and redundant courses, develop innovative methods of course offering and thereby infuse the much needed dynamism in the system.

F. R. Khan
Director
I.R.D.T. Kanpur

ACKNOWLEDGEMENTS

We gratefully acknowledge the guidance and contribution received from the following persons:

- i) Sh. Narendra Kumar Bhushan, IAS Additional Chief Secretary, Technical Education Govt. of U.P. for his exemplary vision & approach.
- ii) Sh. F. R. Khan Director I.R.D.T. Kanpur for continually motivating, guiding and taking keen interest in the review of curriculum.
- iii) All the participants from industries, Polytechnics and other technical institutions for their professional inputs during curriculum workshops.
- iv) CDC Officer and other concerning staff of IRDT for their support and assistance in the conduct of curriculum workshops.
- v) In the last but not least would like to thanks management of the industries who spare not only their precious time but also allowed the visit of their industries to the team making the curriculum.

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LIST OF SUBJECT EXPERTS

The following experts participated in various workshop for Developing the Curriculum Structure and Contents of **PRINTING TECHNOLOGY** at I.R.D.T. Kanpur.

1. Shri Rakesh Tiwari, HOD NRIPT Prayagraj.
2. Shri Mohammad Imran, Lecturer NRIPT Prayagraj.
3. Shri C.P. Maurya, Lecturer NRIPT Prayagraj.
4. Shri S.K. Vishwkerma, Lecturer NRIPT Prayagraj.
5. Shri Kshitiz Kumar Gupta, Lecturer G.P. Chandausi.
6. Shri Chandra Kant Gupta, Lecturer G.P. Chandausi.
7. Smt. Mamta Rani, Lecturer, G.P. Chandausi.
8. Shri Rohit Kumar, Lecturer, G.P. Chandausi.

1. SALIENT FEATURES

- | | |
|--------------------------------------|---|
| 1) Name of the Program | ➤ Diploma in Printing Technology |
| 2) Duration of the Program | ➤ Three years (Six Semesters) |
| 3) Entry Qualification | ➤ Matriculation or equivalent NEP-
2020/NSQF Level 4 as Prescribed
by State Board of Technical
Education, U.P. |
| 4) Pattern of the Programme | ➤ Semester Pattern |
| 5) NSQF Level | ➤ Level – 5 |
| 6) Ratio between theory and Practice | ➤ 40% (Theory)/60% (Practical) |

1) Industrial Training/Internship:

Four and six weeks of industrial training is made mandatory after the II and IV semesters during summer vacation. Total marks allotted to industrial training will be respectively 50 & 100.

In the last (6th Semester) we have made the one semester Industrial training/Internship as optional along with usual classroom training.

2) Audit & Pathways Subjects:

As per AICTE and NEP-2020 directives, Essence of Indian Knowledge, & Tradition, Indian Constitution and Entrepreneurship & Startup subjects on Environmental Studies have been incorporated in the curriculum.

3) Student Centered Activities:

A provision of 3-6 hrs per week has been made for organizing Student Centered Activities for overall personality development of students. Such activities will comprise of co-curricular activities such as expert lectures, self-study, games, hobby classes like

photography, painting, singing etc. seminars, declamation contests, educational field visits, NCC, NSS and other cultural activities, disaster management and safety etc.

4) Project work:

Micro/Mini/Major project work has been included in the curriculum to enable the student to get familiarized with the practices and procedures being followed in the industries and provide an opportunity to work on some live projects in the industry.

2. EMPLOYMENT OPPORTUNITIES

The following are the major employment opportunities for diploma holders in PRINTING TECHNOLOGY:

1. Packaging Industries.
2. Government Presses.
3. Security Presses.
4. Currency Presses.
5. Advertisement Agencies.
6. Government Mints.
7. Publication Sector.
8. Proof Reading Sector.
9. Defense Sector.
10. Banking Sector.
11. Outsourcing Agencies.
12. Newspaper Organizations.
13. Design Studios.
14. Education & Research Sector.
15. Teaching Professionals in different colleges & Universities.
16. Textile industries.
17. Pharmaceutical & Health Care.
18. Software Industries.
19. Service Provider Industries.
20. Free Lancer.

3. LEARNING OUTCOMES OF THE PROGRAM

1. Program Outcomes (POs)

The Program Outcomes (POs) describe the knowledge, skills, and attitudes that students are expected to develop by the time they graduate from the Diploma in Electronics and Communication Engineering program. These outcomes reflect what graduates will be capable of doing because of the learning and training received throughout the course. They represent the professional abilities and attributes that define a diploma holder in engineering.

As defined by the **National Board of Accreditation (NBA)**, the following are the seven Program Outcomes for an engineering diploma graduate:

PO1: Basics and Discipline specific Knowledge

Assimilate knowledge of basic mathematics, science and engineering fundamentals.

PO2: Problem's Analysis and solution

Identify, analyse and solve problems using standard methods and established techniques.

PO3: Design and Development

Design solutions for technical problems.

Assist in designing components, systems, or processes to meet specific requirements.

PO4: Engineering Tools, Experimentation, and Testing

Use modern engineering tools and appropriate techniques to conduct experiments as per BIS standard.

PO5: Socio/ Economic /Environmental impact assessment/remedy.

Apply relevant technologies while considering societal needs, environmental impact keeping in view sustainable and ethical responsibilities.

PO6: Project Management and Communication

Apply engineering management principles, work effectively as an individual or in a team, and communicate clearly on activities.

PO7: Lifelong Learning

Recognize the importance of continuous learning and actively pursue self-improvement to keep pace with technological developments.

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After undergoing this program, students will be able to:

1.	Understanding of the fundamentals of printing technology, including printing processes, ink types, and paper properties.
2.	Knowledge of printing industry safety procedures and guidelines.
3.	Familiarity with the design and prepress process for printed materials.
4.	Ability to operate and maintain various types of printing presses, including letterpress, offset, silk screen, flexographic, gravure, and digital.
5.	Understanding of color theory and color management in printing.
6.	Familiarity with printing substrates, including paper, plastic, and metal.
7.	Ability to troubleshoot printing issues and optimize print quality.
8.	Familiarity with finishing processes, such as cutting, folding, and binding.
9.	Knowledge of the various printing market segments, such as packaging, commercial printing, and publishing.
10.	Ability to estimate print costs and provide quotes for printing jobs.
11.	Understanding of the environmental impact of printing and knowledge of sustainable printing practices.
12.	Knowledge of digital printing technologies, including variable data printing and web-to-print.
13.	Familiarity with printing software, such as Adobe Creative Suite, and prepress software, such as illustrator, InDesign etc.
14.	Ability to operate and maintain post-press equipment, such as cutting machine and die-cutters.
15.	Understanding of the principles of typography and layout design.
16.	Interpret factory acts and laws.
17.	Ability to communicate effectively with clients, coworkers, and vendors.
18.	Understanding of quality control processes in printing.
19.	Ability to analyze customer needs and recommend appropriate printing solutions.
20.	Familiarity with printing industry trends and technological advancements.
21.	Understanding of print production workflows and process optimization.
22.	Knowledge of color calibration and profiling techniques.
23.	Familiarity with packaging design and printing processes.
24.	Ability to manage multiple printing projects simultaneously.
25.	Understanding of the role of print in marketing and communication.
26.	Use computer and IT tools for creating document, making spread sheet and Making presentation.
27.	Ability to troubleshoot and repair printing equipment.
28.	Familiarity with different types of inks and their properties.
29.	Maintain and repair printing equipment to ensure smooth and uninterrupted production.
30.	Understanding of the importance of branding in print design.
31.	Knowledge of the printing sales process and customer relationship management.
32.	Understanding of the role of printing in e-commerce and online retail.

33.	Ability to work effectively in a team environment.
34.	Familiarity with international printing standards and requirements.
35.	Knowledge of industry-specific regulations and guidelines, such as those governing food packaging.
36.	Understanding of the impact of digital media on print production.
37.	Ability to manage inventory and materials for print production.
38.	Complete finishing processes, such as cutting, folding, and binding.
39.	Operate and maintain digital printing technologies, including variable data printing and web-to-print.
40.	Understand the impact of digital media on print production to adapt to changing technological trends.
41.	Knowledge of intellectual property laws and copyright requirements in print production.

4. STUDY AND EVALUATION SCHEME

THIRD SEMESTER

Sr. No.	SUBJECTS	COURSE TYPE & CATEGORY	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
			L	T	P		INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
							Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
3.1	INTRODUCTION TO PRINTING PROCESSES	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100
3.2	GRAPHIC DESIGN & TYPOGRAPHY	PROGRAM CORE (THEORY)	02	-	-	2	40	-	40	60	3	-	-	60	100
3.3	DESK TOP PUBLISHING FOR PRINT PRODUCTION	PROGRAM CORE (PRACTICUM)	01	-	04	3	-	60	60	-	-	40	3	40	100
3.4	PRINTING MATERIALS	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100
3.5	DIGITAL PREPRESS	PROGRAM CORE (PRACTICUM)	01	-	04	3	-	60	60	-	-	40	3	40	100
3.6	SCREEN PRINTING	PROGRAM CORE (PRACTICAL)	-	-	04	2	-	60	60	-	-	40	3	40	100
3.7	(Q) OPEN ELECTIVE-1 OR	OPEN ELECTIVE-1 (THEORY)	02	-	-	2	50	-	50	-	-	-	-	-	N/A
	*ADVANCE SKILL DEVELOPMENT	OPEN ELECTIVE-1 (Certification Course)					-	-	-	-	-	-	-	N/A	
3.8	SUMMER INTERNSHIP** (4) WEEKS	-	-	-	-	2	-	50	50	-	-	-	-	-	50
#Student Centered Activities		-	-	-	12	-	-	50	50	-	-	-	-	-	50
TOTAL		-	12		24	20	120	280	400	180	-	120	-	300	700

NOTE:- (Q) It is compulsory to appear and to pass the examination, but marks will not be included for percentage and division of obtained marks.

* Advance skill development mention at 3.7 in the table provide the scope of selecting the course as per choice from the elective list provided in the syllabus conducted by various agency of repute of duration not less than 20 Hrs (Offline/Online).

** SUMMER INTERNSHIP (4-6 WEEKS) duration to be organized after second semester exam. Evaluation will be in third semester.

Student Centered Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, library, Cultural Activities and self-study etc.

FOURTH SEMESTER

Sr. No.	SUBJECTS	COURSE TYPE & CATEGORY	STUDY SCHEME			Credits	MARKS IN EVALUATION SCHEME										Total Marks of Internal & External
			Periods/Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT							
			L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot			
4.1	TEXT AND IMAGE SETTING	PROGRAM CORE (PRACTICUM)	01	-	04	3	-	60	60	-	-	40	3	40	100		
4.2	PACKAGING TECHNOLOGY	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100		
4.3	BINDING AND FINISHING	PROGRAM CORE (PRACTICUM)	01	-	04	3	-	60	60	-	-	40	3	40	100		
4.4	OFFSET PRINTING	PROGRAM CORE (PRACTICUM)	01	-	04	3	-	60	60	-	-	40	3	40	100		
4.5	IMAGE CARRIER TECHNOLOGY	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100		
4.6	FLEXOGRAPHY PRINTING	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100		
4.7	(Q) OPEN ELECTIVE-2 OR	OPEN ELECTIVE (THEORY)	02	-	-	2	50	-	50	-	-	-	-	-	N/A		
	*ADVANCE SKILL DEVELOPMENT	OPEN ELECTIVE (Certification Course)					-	-	-	-	-	-	-	N/A			
4.8	(Q) ESSENCE OF INDIAN KNOWLEDGE AND TRADITION	AUDIT COURSE	02	-	-	-	50	-	50	-	-	-	-	-	N/A		
#Student Centered Activities		-	-	-	8	-	-	50	50	-	-	-	-	-	50		
TOTAL		-	16	-	20	20	120	230	350	180	-	120	-	300	650		

NOTE:- (Q) It is compulsory to appear and to pass the examination, but marks will not be included for percentage and division of obtained marks.

* Advance skill development mention at 4.7 in the table provide the scope of selecting the course as per choice from the elective list provided in the syllabus conducted by various agency of repute of duration not less than 20 Hrs (Offline/Online).

** SUMMER INTERNSHIP (4-6 WEEKS) duration to be organized after fourth semester exam. Evaluation will be in fifth semester.

Student Centered Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, library, Cultural Activities and self-study etc.

5th SEMESTER

Sr. No.	SUBJECTS	COURSE TYPE & CATEGORY	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME									Total Marks of Internal & External
			L	T	P		INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT						
							Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot		
5.1	GRAVURE PRINTING	PROGRAM CORE (PRACTICUM)	02	-	04	4	-	60	60	-	-	40	3	40	100	
5.2	PROGRAMME ELCTIVE-1	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100	
5.3	PRINTING COSTING AND ESTIMATING	PROGRAM CORE (THEORY)	04	-	-	4	40		40	60	3			60	100	
5.4	PROGRAMME ELCTIVE-2	PROGRAM CORE (PRACTICAL)	-	-	04	2	-	60	60	-	-	40	3	40	100	
5.5	ADVANCED PRINTING TECHNOLOGIES	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100	
5.6	(Q) OPEN ELECTIVE-3 OR	OPEN ELECTIVE (PRACTICUM)	01	-	03	2		50	50	-	-	-	-	-	N/A	
	*ADVANCE SKILL DEVELOPMENT	OPEN ELECTIVE					-	-	-	-	-	-	-	N/A		
5.7	INDIAN CONSTITUTION	AUDIT COURSE	02	-	-	-	50	-	50	-	-	-	-	-	N/A	
5.8	**SUMMER INTERNSHIP (4 Weeks after 4 th semester)		-	-	-	2	-	60*	60*	-	-	40*	3	40*	100*	
	#Student Centered Activities	-	-	-	10			50	50	-	-	-	-		50	
Total			15		21	20	120	230	350	180	-	120	-	300	650	

Q) It is compulsory to appear and to pass the examination, but marks will not be included for percentage and division of obtained marks.

* Advance skill development mention at **5.6** in the table provide the scope of selecting the course as per choice from the elective list provided in the syllabus conducted by various agency of repute of duration not less than 20 Hrs (Offline/Online).

** SUMMER INTERNSHIP (4-6 WEEKS) duration to be organized after fourth semester exam. Evaluation will be in fifth semester.

Student Centered Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, library, Cultural Activities and self-study etc.

6th SEMESTER (NORMAL PATHWAY)

Sr. No.	SUBJECTS	COURSE TYPE & CATEGORY	STUDY SCHEME			Credits	MARKS IN EVALUATION SCHEME									Total Marks of Internal & External
			Periods/Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT						
			L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot		
6.1	ENTREPRENEURSHIP AND START-UP	HUMANITIES AND SOCIAL SCIENCE	02	-	-	2	40	-	40	60	3	-	-	60	100	
6.2	ELECTIVE (PATHWAY)	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100	
6.3	ELECTIVE (SPECIALISATION)	PROGRAM CORE (PRACTICUM)	02	-	03	3	-	60	60	-	-	40		40	100	
6.4	IN-HOUSE PROJECT	PROJECT	4	-	16	12	-	240	240	-	-	160	-	160	400	
#Student Centered Activities			-	-	06	-	-	50	50	-	-	-	-	-	50	
Total			11		25	20	80	350	430	120	-	200	-	320	750	

Student Centered Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, library, Cultural Activities and self-study etc.

OR

(INDUSTRIAL PATHWAY)

Sr. No.	SUBJECTS	COURSE TYPE & CATEGORY	STUDY SCHEME			Credits	MARKS IN EVALUATION SCHEME										Total Marks of Internal & External
			Periods/Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT							
			L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot			
6.1	ENTREPRENEURSHIP AND START-UP (Online Mode)	HUMANITIES AND SOCIAL SCIENCE	-	-	-	2	-	-	-	100	3	-	-	100	100		
6.2	INDUSTRIAL HANDS-ON PRACTICE	INDUSTRIAL	-	-	-	12	150*			200**					350		
6.3	INDUSTRIAL PROJECT	INDUSTRIAL	-	-	-	4	50*			50**					100		
6.4	SEMINAR	IN-HOUSE	-	-	-	2	-	-	100	-	-	-	-	-	100		
Total			-	-	-	20	-	-	300	-	-	-	-	350	650		

NOTE: - 1) The industrial training tenure should not be less than 4 months

2) “ENTREPRENEURSHIP AND START-UP” course is mandatory in industrial training option. It will be taught in contact mode by his/her polytechnic institute. After completion the online course, student must appear for a separate exam conducted by Board of Technical Education, Lucknow.

3) In industrial training option student must attend a seminar at his/her polytechnic institute after training to earn 2 credit.

4) Monthly progress report attested by industrial authority must be submitted during industrial training.

5) The industrial unit must evaluate student using the format provided by polytechnic, in both credits and marks.

6) “*Entrepreneurship and Start-up*” course is also mandatory in Industrial internship/training mode. It will be conducted online mode by his/her polytechnic institute. After completing the online course, students must appear for exam conducted by the Board of Technical Education, Lucknow.

7) ***Evaluation by faculty mentor:-**

The institute will depute one faculty member for mentoring at least 20-30 students undertaking apprenticeship training. Such mentors will monitor, guide and provide counselling to the students as and when required. Faculty mentor of the institute(s) may make a surprise visit to the internship/apprenticeship site to check the student's presence physically. (The Proforma of the evaluation is attached as the Annexure -1)

8) **** Evaluation by industry:-** The industry shall assess the candidates based on the following parameters attendance, discipline and punctuality, familiarity of tools and material, engineering skills, application of knowledge and problem-solving skills, comprehension and observation, professional ethics, safety and environmental consciousness, communication skills, supervisory skills and general conduct during the period (The Proforma of the evaluation is attached as the Annexure -2)

9) **# Evaluation through seminar presentation/Viva-Voce at the institute :-** The student will give a seminar based on his training report, before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria:

OPEN ELECTIVE-1

SR.NO.	(Q) THEORY COURSES NAME
1.	LIBRARY AUTOMATION AND DIGITALISATION
2.	TYPE FACE DESIGNING

SR.NO.	*CERTIFICATE COURSES
1.	COURSES CONDUCTED BY CENTRE OF EXCELLENCE (ESTABLISHED BY THIRD PARTY AS: - TATA TECHNOLOGIES. etc)
2.	COURSES CONDUCTED BY INFOSYS PRINGBOARD
3.	COURSES CONDUCTED BY TCS ION
4.	COURSES CONDUCTED BY OTHER RELEVANT GOVERNMENT, INTERNATIONAL/NATIONAL ORGANIZATION OR PLATFORMS OF REPUTE
5.	COURSES CONDUCTED BY AICTE-ELIS AND CENTRALLY FUNDED TECHNICAL INSTITUTES
6.	COURSES CONDUCTED BY C-DAC
7.	COURSES CONDUCTED BY NEILIT

OPEN ELECTIVE -2

SR.NO.	(Q) THEORY COURSES NAME
1.	DIRECT SELLING
2.	RIGID PACKAGING

SR.NO.	*CERTIFICATE COURSES
1.	COURSES CONDUCTED BY CENTRE OF EXCELLENCE (ESTABLISHED BY THIRD PARTY AS: - TATA TECHNOLOGIES. etc)
2.	COURSES CONDUCTED BY INFOSYS PRINGBOARD
3.	COURSES CONDUCTED BY TCS ION
4.	COURSES CONDUCTED BY OTHER RELEVANT GOVERNMENT, INTERNATIONAL/NATIONAL ORGANIZATION OR PLATFORMS OF REPUTE
5.	COURSES CONDUCTED BY AICTE-ELIS AND CENTRALLY FUNDED TECHNICAL INSTITUTES
6.	COURSES CONDUCTED BY C-DAC
7.	COURSES CONDUCTED BY NEILIT

OPEN ELECTIVE-3

SR.NO.	(Q) THEORY COURSES NAME
1.	AI & ML
2.	IOT
3.	INDUSTRIAL AUTOMATION & MES

SR.NO.	*CERTIFICATE COURSES
1.	COURSES CONDUCTED BY CENTRE OF EXCELLENCE (ESTABLISHED BY THIRD PARTY AS: - TATA TECHNOLOGIES. etc)
2.	COURSES CONDUCTED BY INFOSYS PRINGBOARD
3.	COURSES CONDUCTED BY TCS ION
4.	COURSES CONDUCTED BY OTHER RELEVANT GOVERNMENT,

	INTERNATIONAL/NATIONAL ORGANIZATION OR PLATFORMS OF REPUTE
5.	COURSES CONDUCTED BY AICTE-ELIS AND CENTRALLY FUNDED TECHNICAL INSTITUTES
6.	COURSES CONDUCTED BY C-DAC
7.	COURSES CONDUCTED BY NEILIT

PROGRAMME ELECTIVE-1

SR.NO.	SUBJECT NAME
1.	BOOK PUBLISHING
2.	SECURITY PRINTING
3.	PRINT PRODUCTION PLANNING AND CONTROL

PROGRAMME ELECTIVE-2

SR.NO.	SUBJECT NAME
1.	MACHINE MAINTENANCE
2.	DIGITAL PRINTING
3.	COLOUR SEPARATION TECHNOLOGY

ELECTIVE (PATHWAY)

SR.NO.	SUBJECT NAME
1.	TOTAL QUALITY MANAGEMENT
2.	PRINTING PRESS MANAGEMENT
3.	BUSINESS MANAGEMENT

ELECTIVE (SPECIALISATION)

SR.NO.	SUBJECT NAME
1.	INK TECHNOLOGY
2.	WEB OFFSET TECHNOLOGY
3.	SHEET FED OFFEST TECHNOLOGY

5. GUIDELINES FOR ASSESSMENTS OF STUDENT CENTERED ACTIVITIES (SCA)

It was discussed and decided that the maximum marks for SCA should be 50 as it involves a lot of subjectivity in the evaluation. The marks may be distributed as follows:

- i. 15 Marks for general behaviour and discipline
(by HODs in consultation with all the teachers of the department)
- ii. 10 Marks for attendance as per following:
(by HODs in consultation with all the teachers of the department)
 - a) 75 - 80% 6 Marks
 - b) 80 - 85% 8 Marks
 - c) Above 85% 10 Marks
- iii. *** Even Semester:**
25 Marks maximum for Sports/NCC/Cultural/Co-curricular/NSS activities as per following: (by In-charge Sports/NCC/Cultural/Co-curricular/NSS)
 - a) State/National Level participation
 - b) Participation in two of above activities
 - c) Inter-Polytechnic level participation
 - d)
****Odd Semester:**
25 Marks maximum
 - a) Language Lab Practices
 - b) Group Discussion and Personality Development
 - c) Industrial Visits/Industrial Talks
 - d) Power Point Presentations and Resume Making
 - e) Development of Aptitude and Reasoning Skills
 - f) Participation in the technical Exhibitions, Symposiums, Seminars, Workshops at the Institute /District/State/National Level.

3.1	INTRODUCTION TO PRINTING PROCESSES (Theory)	L T P
		3 0 0

COURSE OBJECTIVES

This core course in Printing Technology provides fundamental knowledge of major printing processes and the working principles of printing presses. The course enables students to understand how text and images are reproduced by transferring an image from a master form to a substrate such as paper, board, plastic, or other materials. It covers the role of pressure, ink/toner transfer, and process control in achieving accurate and high-quality print reproduction.

Students will gain both theoretical understanding and practical exposure to conventional and modern printing techniques including letterpress, offset, flexography, gravure, screen printing, and digital printing, along with their applications in packaging, publishing, and commercial printing industries.

COURSE OUTCOMES (CO)

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1: Explain the principles of various printing processes and their modern industrial applications.

CO2: Identify and recognize different printing outputs and evaluate their advantages, limitations, and suitability for specific jobs.

CO3: Describe the configuration and working of offset printing systems, including components and types of offset presses.

CO4: Explain the construction, configuration, and operation of Letterpress and Flexographic presses used in commercial and packaging printing.

CO5: Analyze the working principles of Gravure, Screen Printing, and Digital Printing machines and their role in contemporary print production.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	2	-	-	1	-	-	*	*
CO2	3	3	-	2	1	-	-	*	*
CO3	3	2	3	2	3	-	2	*	*
CO4	3	2	3	2	3	-	2	*	*
CO5	3	3	2	2	3	-	3	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT 1- INTRODUCTION TO PRINTING PROCESSES: (08 Periods)

- 1.1 Basic Principles of Printing Processes – Letterpress, Offset, Gravure, Flexography, Screen Printing and Digital Printing.
- 1.2 Applications of Printing Processes – Letterpress, Offset, Gravure, Flexography, Screen Printing and Digital Printing.

UNIT 2- PRINT RECOGNITION: (08 Periods)

- 2.1 Print recognition of Printing Processes – Letterpress, Offset, Gravure, Flexography, Screen Printing and Digital Printing.
- 2.2 Advantages and Limitations of Printing Processes – Letterpress, Offset, Gravure, Flexography, Screen Printing and Digital Printing.

UNIT 3- OFFSET PRINTING. (08 Periods)

- 3.1 Basic configuration of offset printing.
- 3.2 Single color sheet-fed press, Multi color sheet-fed press, perfecting press and mini offset press.

UNIT 4- LETTER PRESS & FLEXOGRAPHY PRINTING. (08 Periods)

- 4.1 Basic configuration of Letterpress and Flexography printing.
- 4.2 Types of Letterpress machine – Plane to Plane, Plane to Cylinder and Cylinder to Cylinder.
- 4.3 Types of Flexography machine - In-line press, Stack press and Satellite press.

UNIT 5- GRAVURE, SCREEN & DIGITAL PRINTING. (10 Periods)

- 5.1 Configuration of Gravure machine – Infeed, Outfeed, Printing unit - printing cylinder, doctor blade and impression cylinder.
- 5.2 Parts of Screen printing – Frame, Mesh, Squeegee, Table.
- 5.3 Basic knowledge of digital printing.

TEXT BOOKS / REFERENCE BOOKS:

1. Letter press printing part I-II, C.S. Mishra, Anupam Prakashan, Prayagraj.
2. Akshar Mudran Shastra, C.S. Mishra, Anupam Prakashan, Prayagraj..
3. Technology of offset printing, C.S. Mishra, Anupam prakashan, Prayagraj.
4. Offset Mudran Shastra, C.S. Mishra, Anupam prakashan, Prayagraj.
5. Commercial Screen Printing, Bhamare, Adorn Publication Naupada, Thane.
6. Printing Technology, Adam Fox.

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should show various types of printed materials to the students. Students should be asked to collect samples of various materials available in the market. Visits to industry should be planned to demonstrate use of various types of materials or Printing machines in the industry.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	8	15
2	8	15
3	8	15
4	8	15
5	10	40
Total	42	100

3.2	GRAPHIC DESIGN & TYPOGRAPHY (Theory)	L T P
		2 0 0

COURSE OBJECTIVES

Printing production is based on proper designing and typographic planning. Introduction of Graphic Design & Typography subject is essential to impart basic knowledge and skills in graphic design principles, layouts, typographic principles and methods etc. This subject is essential as prerequisite for studying printing design and letter assembly subjects in the Diploma Curriculum.

COURSE OUTCOMES (CO)

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1: Identify and classify different types of printed products and understand their design requirements.

CO2: Apply graphic design principles and visual elements to create balanced and effective layouts.

CO3: Understand color theory, color models, and their application in print production.

CO4: Describe typographic anatomy, typeface classification, and suitability for various printing applications.

CO5: Demonstrate knowledge of typesetting techniques and proofreading procedures used in pre-press preparation.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	2	-	-	1	-	-	*	*
CO2	3	3	3	2	2	-	2	*	*
CO3	3	2	2	-	2	-	3	*	*
CO4	3	2	2	-	1	-	2	*	*
CO5	3	3	2	2	3	-	-	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT 1- PRINTED PRODUCTS:

(04 Periods)

- 1.1 Introduction to format and design factors for printed products, photography and illustrations.
- 1.2 Embellishment: Leaflets, Pamphlets, Booklets, Folders, Catalogues, Brochures, Manuals, Books, Magazines and Newspapers, Business-forms and Commercial Stationery, Labels, Cartons, Point of Sale - Display Materials, etc.

UNIT 2- GRAPHIC DESIGN PRINCIPLES, VISUAL INGREDIENTS AND LAYOUTS:

(04 Periods)

- 2.1 Graphic Design Principles: Balance, Geometrical and Optical Centres, White Space, Optical Space, Harmony, Contrast, Unity, Proportion, Rhythm, Emphasis, Simplicity, etc.
- 2.2 Visual ingredients: Point, Line, Shape, Mass, Size, Scale, Colour, Tone, Texture, Pattern, etc.

UNIT 3- COLOUR ELEMENTS:

(06 Periods)

- 3.1 Colour theory: terms used to describe colour; warm and cold colours; hue, shade and tint.
- 3.2 Colour wheel: terms used to describe relationship between colours - monochromatic, complementary, analogues, split complimentary.

UNIT 4- TYPOGRAPHY:

(08 Periods)

- 4.1 Introduction to Printing Type, X-height, Ascender and descender, baseline and body width. Parts of type face.
- 4.2 Selecting type face suitable to the subject or purpose. Relationship between Type Face and Printing Processes & between Type Face and Paper Surfaces. Legibility and readability.

UNIT 5- TYPESETTING TECHNIQUES:

(06 Periods)

- 5.1 Different methods of Typesetting: Introduction to Hand composing and Mechanical type setting, Photo type setting, Digital type setting.
- 5.2 Proof reading: Proof reader and Copy holder, Proof Reading marks, Kinds of Proofs, Proof Reading procedure - correction and page make up.

TEXT BOOKS / REFERENCE BOOKS:

1. Art & Production, N.N. Sarkar, Sagar Publication, New Delhi.
2. A Hand Book of Typography, Kailas, Anupam Prakashan, Prayagraj.
3. Theory & Practical of composition, A.C. Goel, Saroj Prakashan, Prayagraj.
4. Adhunik Sanyojan Shastra, C.S. Misra, Anupam prakashan, Allahabad.
5. Elements & Design & Typography, B.D. Mendiratta, Asian Books Private Limited, New Delhi.

INSTRUCTIONAL STRATEGY

Graphic Design and Typography is a graphical and typographical designing subject. Teacher should show various types of designed printed materials to the students. Students should be asked to collect samples of various printed material available in the market.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	04	15
2	04	15
3	06	20
4	08	30
5	06	20
Total	28	100

3.3	DESKTOP PUBLISHING FOR PRINT PRODUCTION (Practicum)	L T P
		1 0 4

COURSE OBJECTIVES:

The objective of this course is to enable the students to develop proficiency in utilizing graphic design software tools for layout creation and manipulation. Apply branding guidelines effectively to design professional letterheads, ensuring consistency with company identity. Learn to create visually appealing and well-organized layouts for tabloid publications. Gain skills in designing informative and visually engaging brochures that effectively communicate messages. Understand and apply the principles of the golden rule to create balanced and visually pleasing layouts for books.

COURSE OUTCOMES (CO):

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1 • Use of different designing software.
- CO2 • Designing of different layouts using logo, colour and typography.
- CO3 • Creation of book cover and inner pages.
- CO4 • Designing book pages, proofing and imposition.
- CO5 • Process of ripping and designing of display materials.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	2	*	*
CO2	3	3	-	-	-	-	1	*	*
CO3	3	3	-	-	-	-	1	*	*
CO4	3	3	3	-	-	-	2	*	*
CO5	3	2	-	-	-	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS:

UNIT 1- VARIOUS SOFTWARE USED FOR DESIGNING (03 Periods)

Graphic Design Software, Digital Painting and Illustration Software, Desktop Publishing Software, 3D Modelling & Animation Software and Other Designing Software.

Ex. No.	Name of Experiment	Periods
1	Designing a Brochure	4
2	Designing a Mark sheet / Certificate	4

UNIT 2- INTRODUCTION TO LOGO DESIGN, TYPOGRAPHY AND PAGE LAYOUT (03 Periods)

Ex. No.	Name of Experiment	Periods
1	Design a letterhead that incorporates the company's branding guidelines, including the logo, colour scheme, and typography	6
2	Create a layout for tabloids	4

UNIT 3- INTRODUCTION TO TABLE OF CONTENT AND COMMON DESIGNING CONCEPT (02 Periods)

Ex. No.	Name of Experiment	Periods
1	Create a layout of book cover	6
2	Creating of master pages and Table of Content for a book	4

UNIT 4- PRE-FLIGHTING, PROOFING & IMPOSITION (03 Periods)

Ex. No.	Name of Experiment	Periods
1	Create a layout of main text pages of books	6
2	Imposition of main text pages	6

UNIT 5- RASTER IMAGE PROCESSORS, ARCHIVING, VERSIONING (03 Periods)

Ex. No.	Name of Experiment	Periods
1	Designing an Advertisement	4
2	Designing a Business Card.	4
3	Creating Magazine Cover page.	4
4	Creating parts of a Newspaper	4

TEXT BOOKS/REFERENCE BOOKS:

1. Desktop Publishing for Dummies by Nancy C. Muir.
2. Practical tips for creating perfect print jobs for all, 1st edition, 2023, Creative Publishers, Mumbai.
3. The Design of Everyday Things by Don Norman.
4. Adobe In Design CC Classroom in a Book by Kelly Kordes Anton.
5. Robin Williams , The Non-Designer's Design Book, 2015, Peachpit Press, 4th Edition

INSTRUCTIONAL STRATEGY

Begin with comprehensive software tutorials to familiarize students with desktop publishing tools and functionalities. Provide hands-on exercises like covering layout design, typography and image manipulation. Foster peer collaboration through collecting printed materials, analysis and learning from peers. Offer opportunities for independent exploration and experimentation to encourage creativity and problem-solving skills.

3.4	PRINTING MATERIALS (Theory)	L T P
		3 0 0

COURSE OBJECTIVES

Printing Materials course objectives focus on providing students with a deep technical understanding of the raw materials, chemical properties, and selection criteria essential for various printing processes. He will also learn about the testing of materials for quality control.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1 • Learn about different photographic materials.
- CO2 • Basic knowledge about polymers.
- CO3 • Knowledge of different substrates.
- CO4 • Knowledge of different printing inks and ink drying methods.
- CO5 • Knowledge of different kinds of testing methods.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	-	*	*
CO2	3	-	-	-	-	-	-	*	*
CO3	3	-	-	-	-	-	2	*	*
CO4	3	-	-	-	-	-	3	*	*
CO5	3	2	2	3	-	-	1	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT 1- PHOTOGRAPHIC MATERIALS:

(10 Periods)

- 1.1 Basic ingredients of emulsion and their functions.
- 1.2 Developer's constituents and their functions.
- 1.3 Chemicals used for after treatment.
- 1.4 Introduction to non-silver material.

UNIT 2- POLYMERS:

(08 Periods)

- 2.1 Monomers and Polymers.
- 2.2 Homo-polymers and Co-polymers.
- 2.3 Types of polymerization reactions: Addition polymerization and condensation polymerization.
- 2.4 Types of Polymers: Plastics, rubber and Fibers.

UNIT 3- SUBSTRATES:

(08 Periods)

- 3.1 Fibrous and non-fibrous raw materials used in paper and board manufacture.
- 3.2 Varieties of papers and boards: Characteristics, classification, identification etc.
- 3.3 Dimensional stability of paper: Effect of humidity on paper.
- 3.4 Other substrates: Metal foil, plastic, poly, pet, BOPP, CPP, etc.

UNIT 4- PRINTING INKS:

(10 Periods)

- 4.1 Constituents of printing ink - general characteristics and requirements of printing inks for various printing processes.
- 4.2 Basic drying methods and their suitability for printing processes.
- 4.3 Different inks: heat set inks, quick set inks, metallic inks, flexography and gravure ink etc, and their suitability to different applications.
- 4.4 Digital inks; solvent type and powder type.

UNIT 5- RAW MATERIAL TESTING METHOD:

(06 Periods)

GSM, Tensile strength, bursting strength, folding strength, stiffness test (Grain direction and cross direction), Cobb test, etc.

TEXT BOOKS/REFERENCE BOOKS:

- 1. Printing inks and papers, C.S. Mishra, Anupam Prakashan, Allahabad.
- 2. Mudran Syahiyan Tatha Kagaj, C.S. Mishra, Anupam Prakashan, Allahabad.
- 3. Materials in printing process by L.C. Young
- 4. The complete technology book on Printing inks, NIIR Board.
- 5. Materials Science, Dr. M. Arumugam.
- 6. Science and technology of Printing Materials, by Prakash Setty.

INSTRUCTIONAL STRATEGY

Printing material subject is the scientific approach to the different printing substrates. Teacher should show the different test of material for quality control. Student should learn about the different types of Substrates, Ink and testing methods.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	10	25
2	8	20
3	8	20
4	10	25
5	6	10
Total	42	100

3.5	DIGITAL PREPRESS (Practicum)	L T P
		1 0 4

COURSE OBJECTIVES:

Digital prepress course objectives focus on equipping students to manage the workflow before printing, covering file preparation, color management, trapping, imposition, proofing and using industry software to ensure print-ready, high-quality digital files, preparing them for various printing technologies like digital and offset.

COURSE OUTCOMES(CO):

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1 • Introduce of digital prepress and creation of multi color image using software.
- CO2 • Learn about digital photography and digital proofing using scanners.
- CO3 • Work on digital page assembling, Imposition scheme using software, RIP and different file formats.
- CO4 • Learn about color management using CIE lab, spectrophotometer and identify prepress issues; troubleshoot, quality control.
- CO5 • Learn the workflow of print production system.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	-	*	*
CO2	3	2	-	-	-	-	2	*	*
CO3	3	2	2	-	-	-	-	*	*
CO4	3	3	3	3	-	-	3	*	*
CO5	3	1	-	-	-	-	1	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS:

UNIT 1- DIGITAL PREPRESS – INTRODUCTION

(02 Periods)

- 1.1 Elements of Digital Page – Text, Images, Graphics
- 1.2 Prepress checklist. AM and FM screening, Digital Proof

Ex. No.	Name of Experiment	Periods
1	Create a Logo using Adobe InDesign / Corel Draw	6
2	Create a multicolor invitation / certificate using image editing software	6

UNIT 2-DIGITAL PHOTOGRAPHY & DIGITAL PROOFING (03 Periods)

2.1 Digital input processes - Digital camera, Scanner and OCR.

2.2 Types of Scanners – Flat bed and Drum Scanner.

Ex. No.	Name of Experiment	Periods
1	Image capturing by digital camera & editing.	4
2	Image scanning by scanner & image editing	4

UNIT 3- DIGITAL IMAGE ASSEMBLY (03 Periods)

3.1 Page Assembly and Imposition - Digital assembly techniques.

3.2 Imposition plans - sheet work and half sheet work.

3.3 Raster Image Processor (RIP)

3.4 Data Formats – Bitmap & Vector, Data storage, distribution, backup or transport.

Ex. No.	Name of Experiment	Periods
1	Preparation of imposition scheme for sheet work using Imposing Software.	4
2	Preparation of imposition scheme for half sheet work using Imposing Software.	4
3	Apply UCR, GCR and color separate the scanned image using image editing software	4

UNIT 4- COLOUR MANAGEMENT (03 Periods)

4.1 Purpose of Colour Management

4.2 CIE Chromaticity Diagram - CIE Lab Values.

4.3 Colour perception - colorimetric description of colour – 3 c's of colour management

Ex. No.	Name of Experiment	Periods
1	Measuring CIE Lab values using Spectrophotometer	6

2	Identify and troubleshoot common prepress issues and quality control	6
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UNIT 5- WORKFLOW OF PRINT PRODUCTION SYSTEM (03 Periods)

5.1 Workflows – PDF, Pre-flighting techniques

5.2 CIP 3, CIP 4

Ex. No.	Name of Experiment	Periods
1	Perform Pre-Flighting operations for a given Text image and graphics files	12

TEXT BOOKS/REFERENCE BOOKS:

1. Helmut Kipphan, Handbook of Print Media: Technologies and Production Methods, 1st Edition, 2001, Springer-Verlag Berlin Heidelberg, ISBN: 978-3540673264
2. S.K. Jain, Digital Printing and Publishing Technology, Tata McGraw-Hill Education
3. Gaurav Gupta, Color Management, Focal Press
4. Sonka, Hlavac, and Boyle, Image Processing and Analysis, Chapman & Hall/CRC

INSTRUCTIONAL STRATEGY:

Digital prepress instructional strategy is a structured educational approach designed to teach the critical phase between design and final printing. It focuses on ensuring digital files are technically perfect, color-accurate, and structurally sound to avoid costly physical errors.

3.6	SCREEN PRINTING (Practical)	L T P
		0 0 4

COURSE OBJECTIVES:

The objective of this course is to enable the students to attain knowledge and skills to prepare image carriers for Screen Printing. Master Screen Printing concepts, including screen mesh and squeegee functions. Selection of screen-printing inks and the application of screen printing on flat and curved surfaces. Trouble shoot common issues in screen printing including print defects and ink problems. Screen preparation by direct and indirect method.

COURSE OUTCOMES(CO):

The practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1 • Basic knowledge of screen printing, Frame Preparation, tensioning, stretching the screen fabric.
- CO2 • Screen preparation by direct and indirect methods.
- CO3 • Select the different types of screen printing ink.
- CO4 • Single color and multi-color printing on different substrates.
- CO5 • Uneven surface printing by screen printing.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	2	-	3	-	-	3	*	*
CO2	3	3	-	-	-	-	2	*	*
CO3	3	-	-	-	-	-	-	*	*
CO4	3	2	-	-	-	-	2	*	*
CO5	3	1	-	-	-	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

LIST OF EXPERIMENT:

Ex. No.	Name of Experiment	Hours
1	Introduction to Screen Printing, Frame Preparation, tensioning, stretching the screen fabric	12
2	Stencil preparation by Direct method and Indirect method.	18
3	Screen Printing ink selection	04
4	Printing on different substrates by single color and multi-color	18
5	Printing on uneven surfaces.	04

INSTRUCTIONAL STRATEGY

Start with introductory lectures to provide an overview of Screen Printing process and their significance in the printing industry. Incorporate practical demonstrations and simulations to illustrate image carrier preparation techniques, emphasizing hands-on learning. Organize interactive workshops focusing on Screen Printing inking systems, substrates, encouraging active participation and problem-solving. Facilitate guided tours to printing facilities or guest lectures from industry experts to offer real-world insights into Screen printing and its equipment.

3.7.1	LIBRARY AUTOMATION AND DIGITALISATION (Theory)	L T P
		2 0 0

COURSE OBJECTIVES

To introduce students to the basic concepts of Library automation. Explaining different automation software and their uses. Provide information on digitization processes, tools, and standards. Develop skills in digital library creation and management.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1• Understand the concept and need of library automation.

CO2• Operate various library automation software like E-Granthalaya, KOHA SOUL.

CO3• Understand and apply digitization tools and standards.

CO4• Create and manage a basic digital library.

CO5• Handle issues related to data protection and copyright.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	2	*	*
CO2	3	-	-	-	-	-	-	*	*
CO3	3	-	-	-	-	-	-	*	*
CO4	3	-	-	-	-	-	1	*	*
CO5	3	-	-	-	-	-	-	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENT

UNIT 1- (4 Periods)

Introduction to Library Automation Definition, objectives, manual vs automated system, History and development of automation in libraries, Benefits of automation

UNIT 2- (06 Periods)

Library Automation Systems Area of automation: Acquisition, cataloguing, circulation, semi control. Popular software: KOHA, E-Granthalaya , SOUL . OPAC(Online public acces catalogue)

UNIT 3- (06 Periods)

Digitization Tools and Benefits of Digitization File formats (PDF, TIFF, JPEG), and OCR (optical character recognition)

UNIT 4- (06 Periods)

Digital Library Features & types of digital libraries, Digital Repositories and institutional repositories Introduction to Digital Library software (E- Granthalaya)

UNIT 5- (06 Periods)

Data Protection and Copyright Copyright Licensing and IPR. Security of digital documents Open access & creative commons.

INSTRUCTIONAL STRATEGY

Library automation and digitalization have transitioned from being luxury upgrades to essential requirements for modern libraries, particularly in academic settings where they support remote learning, digital access to resources, and efficient management.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	4	12
2	6	22
3	6	22
4	6	22
5	6	22
Total	28	100

3.7.2	TYPE FACE DESIGNING (Theory)	L T P
		2 0 0

COURSE OBJECTIVES

The objective of this course is to enable the students to develop the skill of type face designing. Knowledge of type family and their characteristics. Learn to type size measurement. Understand different latest software using in type face designing. Understand about Type font and type colour psychology.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1• Introduction of different type faces
- CO2• Designing of different type faces using latest software.
- CO3• Different type face Anatomy.
- CO4• Different parts of type face.
- CO5• Different software tools using for type face designing and scope.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	-	*	*
CO2	3	-	-	-	-	-	2	*	*
CO3	3	-	-	-	-	-	-	*	*
CO4	3	-	-	-	-	-	-	*	*
CO5	3	-	-	-	-	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT 1- INTRODUCTION OF TYPE FACES (04 Periods)

1.1 Introduction of different type faces eg. Metallic, wooden and digital type faces.

UNIT 2- DESIGNING OF DIFFERENT TYPE FACES (08 periods)

2.1 Introduction of different latest software for type face designing.

2.2 Application of different latest software for type face designing.

UNIT 3- INTRODUCTION OF TYPE FACE ANATOMY (04Periods)

3.1 Different type face Anatomy such as Serif, Sen serif, Proportion, Font metrics, Optical sizing etc.

UNIT 4- DIFFERENT PARTS OF TYPE FACE (06 Periods)

4.1 Different parts of type e.g. strokes, counter, bevel etc.

UNIT 5- TOOLS AND TECHNIQUES OF TYPE FACE DESIGNING (06 Periods)

5.1 Different software tools using for type face designing.

5.2 Scope of type face designing.

TEXT BOOKS/REFERENCE BOOKS:

1. The Visual history of Types by Paul McNiel.
2. The Elements of Typographic Style by Robert Bringhurst.
3. The Anatomy of Type by Stephen Coles.
4. Akshar Mudran Shastra by C S Mishra.
5. Designing with Type by James Craig.

INSTRUCTIONAL STRATEGY

Begin with comprehensive software tutorials to familiarize students with Typeface Designing. Provide hands-on exercises and guided projects covering Typeface design, Type Style and psychology of Types. Foster peer collaboration through group projects and critique sessions to encourage feedback and learning from peers. Offer opportunities for independent exploration and experimentation to encourage creativity and problem-solving skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	4	15
2	8	30
3	4	15
4	6	20
5	6	20
Total	28	100

4.1	TEXT & IMAGE SETTING (Practicum)	L T P
		1 0 4

COURSE OBJECTIVES

Text and image setting in printing technology—commonly referred to as prepress or composition—focus on equipping students with the skills to prepare, edit, and arrange text and images for reproduction across various printing processes. Key areas include digital file preparation, layout design, typography, and color management.

COURSE OUTCOMES (CO):

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1• Knowledge of different Typesetting techniques and machines.
- CO2• Knowledge of different typographic measurement system and DTP work.
- CO3• Knowledge of different image setting systems and image setter.
- CO4• Knowledge different input, output and storage devices.
- CO5• Work on production routine such as inputting, outputting, quality control, page makeup and editing correction.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	-	*	*
CO2	3	-	-	-	-	-	-	*	*
CO3	3	-	-	-	-	-	-	*	*
CO4	3	-	-	-	-	-	2	*	*
CO5	3	-	-	-	-	-	3	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT 1-TYPESETTING TECHNIQUES:

(02 Periods)

- 1.1 Introduction to Mechanical and Digital typesetting system.

Ex. No.	Name of Experiment	Periods
1	Demonstration of different typesetting techniques.	8

UNIT 2-TYPOGRAPHIC MEASUREMENT SYSTEM:

(04 Periods)

2.1 Units of Measurement, Point system, Units.

2.2 Computerized Measurement by different latest system.

Ex. No.	Name of Experiment	Periods
1	Setting of text, table and tabular setting on Desk Top Publishing system.	12

UNIT 3- IMAGE SETTING SYSTEMS:

(03 Periods)

3.1 Suitability & limitations of different image setting systems.

3.2 Basic components of modern image setter and their functions

Ex. No.	Name of Experiment	Periods
1	Demonstration on modern image setter	12

UNIT 4- INPUT, OUTPUT AND STORAGE DEVICES:

(03 Periods)

4.1 Different input, output and storage devices for text and image setting.

Ex. No.	Name of Experiment	Periods
1	Demonstration on different input and output devices eg; scanner, work station, auto backup devices, Printers etc.	12

UNIT 5- PRODUCTION ROUTINE:

(02 Periods)

5.1 Steps in Text Processing, Scanning operations for illustrations outputting and quality control.

5.2 Editing corrections and page make up for commercial jobs

Ex. No.	Name of Experiment	Periods
1.	Editing correction and page makeup on the latest software	12

TEXT BOOKS/REFERENCE BOOKS:

- Elements of Design & Typography by BD Mendiratta.

- Art and Print Production. By NN Sarkar

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should show various types of printed products and their process to applying for printing. Students should be asked to collect samples of various paper samples and card sheets available in the market.

4.2	PACKAGING TECHNOLOGY (Theory)	L T P
		3 0 0

COURSE OBJECTIVES

Packaging is an important tool in modern business. A bulk printing is done for packaging in the printing industry. Printing for packaging has emerged as an area of specialization. Hence this course has been included in the curriculum to impart basic knowledge of packaging technology to enable the student to apply the same in his professional career.

COURSE OUTCOMES (CO)

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1• Learn the basics of Packaging.

CO2• Different factors of packaging design.

CO3• Learn about different types of packaging materials.

CO4• Applications of different packaging materials.

CO5• Ancillary materials used for packaging and special packages.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	3	*	*
CO2	3	-	-	-	-	-	1	*	*
CO3	3	-	-	-	-	-	2	*	*
CO4	3	-	-	-	-	-	3	*	*
CO5	3	-	-	-	-	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT 1- BASICS OF PACKAGING

(08Periods)

1.1 Definition, purpose and types of packaging.

1.2 Functions of packaging - Mechanical, chemical and biological protective functions.

- 1.3 Odour and flavour contamination, shelf life.
- 1.4 Different types of packaging test.

UNIT 2- PACKAGING DESIGN

(06 Periods)

- 2.1 Consumer research and sales promotion through package design.
- 2.2 Factors influencing design of a package.
- 2.3 Surface design to suit production limitations.

UNIT 3- PACKAGING MATERIAL

(06 Periods)

- 2.1 Different kinds of fibre boards- Solid boards, corrugated boards.
- 2.2 Flexible packaging materials- plastic films (PET, BOPP, PVC, PP, LDPE, NYLON), aluminium foil, and paper.
- 2.3 Rigid packaging materials - glass, metal (cans), hard plastics (PET, HDPE).

UNIT4- APPLICATION OF PACKAGING

(12 Periods)

- 4.1 Paper based packaging; applications, advantage and limitations.
- 4.2 Wood, jute and textile based packaging; applications, advantages and limitations.
- 4.3 Metal based packaging: applications, advantages and limitations.
- 4.4 Glass based packaging; applications; advantages and limitations.
- 4.5 Plastic based packaging; applications; advantages and limitations.

UNIT 5- ANCILLARY MATERIALS AND SPECIAL PACKAGES

(10 Periods)

- 5.1 Cushioning materials; functions, kinds and selection factors.
- 5.2 Sealing tapes: Kinds, applications, storage and compatibility.
- 5.3 Caps and Closures: functions, materials, metal caps, plastic moulded caps, liners and materials used.

TEXT BOOKS/REFERENCE BOOKS

- 1 Fundamentals of Packaging Technology – S. Natarajan, M. Govindarajan.
- 2 Packaging Technology – Volume I – IIP
- 3 Packaging Technology – Volume II – IIP
- 4 Hand Book of Packaging Technology, Eiri Board

INSTRUCTIONAL STRATEGY

Packaging Technology is a packaging subject which increasing life of product and selling. Teacher should show various types of packaging materials to the students. Students should be asked to collect samples of various packaging material available in the market for better understanding about package designing and different packing procedure.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	8	20
2	6	15
3	6	15
4	12	30
5	10	20
Total	42	100

4.3	BINDING AND FINISHING (Practicum)	L T P
		1 0 4

COURSE OBJECTIVES

This is a core subject. After printing is complete, the printed sheets are required to be put in a proper shape such as books, magazine, register, etc. For this, knowledge of various methods and techniques of binding and finishing is very essential. Aspect of printing, particularly in relation to the requirements of designing the printed products.

COURSE OUTCOMES (CO):

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1• Learn about binding techniques, binding operations, warehouse and basic tools & equipment used in binding.

CO2• Different types of binding materials.

CO3• Learn about different types end papers.

CO4• Different kinds of securing operations.

CO5• Different kinds of covering and finishing operations.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	2	-	-	3	*	*
CO2	3	-	-	-	-	-	1	*	*
CO3	3	-	-	-	-	-	-	*	*
CO4	3	-	-	1	-	-	-	*	*
CO5	3	-	-	-	-	-	-	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT 1- BINDING OPERATIONS AND WAREHOUSE: (03 Periods)

Unprinted paper warehouse and printed paper warehouse, storing, temperature, humidity

1.1 Definition of binding, different kind of binding, basic tools & equipment used in binding.

1.2 Binding Operations: Jogging, knocking, counting, folding, gathering, collating, stitching, sewing, cutting and trimming operations, Treatment of plates and maps, tipping and guarding

1.3 Unprinted paper warehouse and printed paper warehouse, storing, temperature, humidity

Ex. No.	Name of Experiment	Periods
1	Study of tools and machinery, their uses and types of binding.	4
2	Jogging, counting and folding. Side and saddle - Odd and even number stitching.	4

UNIT 2- BINDING MATERIALS

(02 Periods)

2.1 Paper, boards, adhesive, binding cloths rexine, leather and other materials.

Ex. No.	Name of Experiment	Periods
1	Materials and supplies essential for a book binding department	4

UNIT 3- END PAPERS

(03 Periods)

3.1 End papers: requirements of end paper, purpose & functions of end paper, kinds of end paper: self, single, double, made end paper, cloth joint end paper, zig-zag end paper and cloth joint zig-zag end paper

Ex. No.	Name of Experiment	Periods
1	Preparation of different types of End papers.	6

UNIT 4- SECURING OPERATIONS

(3 Periods)

4.1 Different kinds of wire stitching: side, centre and saddle stitching.

4.2 Different kinds of sewing: Sewing with thread only, sewing on tapes, sewing on cords (flexible & sawn-in sewing), sewing two sections on, overcasting.

Ex. No.	Name of Experiment	Periods
1	Preparation of Tear-off pad/Writing pad with gild corners.	4
2	Styles of binding: Quarter- bound cut flush, Quarter- bound turned in (Library Style Binding).	8

3	Exercise on sewing machine, stitching m/c, single clamp perfect binding m/c, cutting & trimming m/c etc.	6
4	Manifold book (Carbon duplicate book)	2
5	Rebinding and case making, overcast sewing.	4
6	Mechanical and loose leaf binding machines used.	4

UNIT 5- COVERING & FINISHING OPERATIONS

(03 Periods)

5.1 Measuring and cutting to sizing and shape, applying adhesive and turning-in, pressing, setting the groove or joints, setting the head, setting the band, polishing, pressing and pasting down

Ex. No.	Name of Experiment	Periods
1	Printing and decorating cover- stamping with ink, with foil, blind.	4
2	Finishing processes: Operation of ruling machine, operation of blocking machine, numbering machines: hand numbering and type-high numbering machine, operations care and maintenance. Planning a job for hand numbering, finishing leather, calico cover with gold foil embossing, hand tooling and blind tooling methods, bronzing, varnishing and other surface treatments.	6

TEXT BOOKS/REFERENCE BOOKS

1. Martin, A.G., Finishing Process in Printing, Focal, 1972.
2. Binding and Finishing Processes – by B.D. Mediratta.
3. Introduction to Book Binding (HB) – by C.S. Mishra.
4. Jildbaji Parichay (HB) – by C.S. Mishra.
5. Introduction to printing and finishing- by Hugh M. Spiers.

INSTRUCTIONAL STRATEGY

Student should learn how the printed or unprinted sheets are required to be put in a proper shape such as books, magazine, register, etc. Teacher should elaborate the different binding & finishing operations as well as different types of machines involved in the binding & finishing department.

4.4	OFFSET PRINTING (Practicum)	L T P
		1 0 4

COURSE OBJECTIVES:

The objective of this course is to focus on providing practical skills in press operation, setup, and maintenance, alongside theoretical knowledge of pre-press, color management, quality control, and troubleshooting, preparing students to manage multi-color printing workflows, understand job specifications, and ensure high-quality output from sheet-fed or web offset presses.

COURSE OUTCOMES(CO):

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1• Introduction to Sheetfed Offset Presses, safety precautions while working and using tools / equipments.
- CO2• Learn about feeder setting and adjustment of sheet control devices & delivery sections.
- CO3• Preparation of printing unit in sheet fed offset press and printing colour jobs.
- CO4• Infeed setting and web control in web offset presses.
- CO5• Preparation of delivery unit in web fed offset presses and printing operation.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	3	*	*
CO2	3	2	2	2	-	3	-	*	*
CO3	3	2	2	3	-	2	-	*	*
CO4	3	3	3	2	-	2	-	*	*
CO5	3	3	2	1	-	2	-	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS:

UNIT 1- INTRODUCTION TO SHEETFED OFFSET PRESSES (03 Periods)

Principles of offset printing, offset machine units – Feeding, Printing and Delivery units. Configuration and Structure of Sheet fed Presses: Single colour, Multi colour. Different type of Presses: Inline Press, Stack Press, Blanket to Blanket (Perfecting) Press and CIC (Common Impression cylinder) Press.

Ex. No.	Name of Experiment	Periods
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1	Safety precautions while working on machines.	2
2	Introduction to tools, equipment and material used in offset lab.	2

UNIT 2- SHEET CONTROL AND DELIVERY IN OFFSET PRESS (02 Periods)

Types of Feeders – Friction feeders and Suction feeders, Sheet Registering Devices – Front lay and Side lay, Sheet detectors, Sheet Insertions Devices, Delivery Section.

Ex. No.	Name of Experiment	Periods
1	Adjustment of automatic feeders for single sheet feeding	4
2	Setting of Front lay and Side lay	2
3	Adjustment of sheet control devices and delivery sections	4

UNIT 3- PREPARATION OF PRINTING UNIT IN OFFSET PRESS (03 Periods)

Pre Make ready and Make ready operations, Construction and functions of Plate Cylinder, Blanket Cylinder, Impression Cylinder, Transfer Cylinder and Delivery Cylinder, Types of Blankets, Inking and Dampening System, Roller setting method.

Ex. No.	Name of Experiment	Periods
1	Pre-make-ready operations of offset printing machines.	3
2	Make-ready operations of offset printing machines.	3
3	Preparation and fitting of offset blanket	2
4	Preparation of fountain solution.	2
5	Adjustment of inking and dampening rollers	2
6	Print a Single colour Job	4
7	Print a Multi-colour Job	4

UNIT 4- WEBFED OFFSET PRESSES – INFED AND WEB CONTROL (03Periods)

Development of web fed offset presses. Types of Reel Stands, Automatic Splicers – Zero Speed Splicer and Flying Splicer, Web Control.

Ex. No.	Name of Experiment	Periods
1	Web feeding and adjustment of web tension control	4

2	Adjustment of manual and automatic splicer	4
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UNIT 5- WEBFED OFFSET PRESSES – DELIVERY UNIT

(03 Periods)

Types of Dryers, Chilled Rollers, Types of Folders – Former, Double Former, Jaw, Chopper, Combination and Ribbon Folder, Auxiliary Equipment.

Ex. No.	Name of Experiment	Periods
1	Preparation of machine for printing and folder setting	4
2	Adjustment of Driers and Chillers	2
3	Multi-colour printing operation	4
4	Colour sequence alteration and their results	4

TEXT BOOKS/REFERENCE BOOKS:

1. Technology of offset printing, C.S. Mishra, Anupam Prakashan Prayagraj.
2. Sheet Fed Offset Technology, Anjan Kumar Baral, Arahant Prakashan.
3. Offset Printing and trouble shooting practical guide, K. Goswami, Anupam Prakashan Prayagraj.
4. Offset Mudran Shastra (Hindi), C.S. Misra, Anupam Prakashan Prayagraj.
5. Web Offset Printing Technology by R. K. Gupta.
6. Web Offset Printing Technology by R. K. Gupta.
7. Web Offset Printing by S. K. Ghosh

INSTRUCTIONAL STRATEGY

- Deliver lectures on the principles, processes, and practices of offset printing.
- Demonstrate hands-on techniques for operating offset printing presses, performing pre-press and post-press operations, and troubleshooting common printing problems.
- Provide students with hands-on training in operating offset printing presses, performing pre-press and post-press operations, and troubleshooting common printing problems.

4.5	IMAGE CARRIER TECHNOLOGY (Theory)	L T P
		3 0 0

COURSE OBJECTIVES:

The objective of this course is to enable the students to this course covers the fundamentals of image carrier technology, including the principles, materials, and processes involved in creating and using image carriers such as plates, cylinders, and screens. Understand the basics of image carrier technology, including the types of image carriers, their applications, and the processes involved in creating and using them. Identify the different materials used in image carrier technology, including metals, plastics, and ceramics, and explain their properties and applications.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1• Introduce the image carrier technology and types of different image carriers with their applications.

CO2• Describe the basic principles of image carrier technology.

CO3• Identify and classify the technical parameters of various image carrier materials and their properties.

CO4• Apply knowledge of different image carrier creation techniques.

CO5• Different applications of image carrier technology and quality control aids.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	-	*	*
CO2	3	-	-	-	-	-	-	*	*
CO3	3	-	-	-	-	-	-	*	*
CO4	3	2	2	-	-	-	1	*	*
CO5	3	1	1	3	-	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS:

UNIT 1- INTRODUCTION TO IMAGE CARRIER TECHNOLOGY (06 Periods)

- 1.1 Definition and importance of image carrier technology.
- 1.2 History and evolution of image carrier technology.
- 1.3 Types of image carriers (plates, cylinders, screens).
- 1.4 Applications of image carrier technology (printing, packaging, textiles).

UNIT 2- PRINCIPLES OF IMAGE CARRIER TECHNOLOGY (08 Periods)

- 5.1 Image formation and transfer.
- 5.2 Image carrier materials (metals, plastics, ceramics).
- 5.3 Surface treatment and preparation.
- 5.4 Image carrier coating and drying.

UNIT 3- IMAGE CARRIER MATERIALS AND PROPERTIES (06 Periods)

- 3.1 Metal image carriers (aluminum, steel, copper, etc.).
- 3.2 Plastic image carriers (photopolymer, etc.).
- 3.3 Properties of image carrier materials (strength, durability, thermal resistance).

UNIT 4- IMAGE CARRIER CREATION TECHNIQUES

(08 Periods)

- 4.1 Etching and engraving.
- 4.2 Electroplating and electroforming.
- 4.3 Photo polymerization and laser imaging.
- 4.4 Computer to Plate (CTP).
- 2.4 Screen printing and screen coating.

UNIT 5- APPLICATIONS OF IMAGE CARRIER TECHNOLOGY AND QUALITY EVALUATION

(14 Periods)

- 5.1 Relief plates for Letterpress and Flexography.
- 5.2 Offset plates processes – Paper Plate, Surface Plate, PS Plate, Wipe on Plate, Multi Metal Plate, Deep Etch Plate, Thermal Plate, etc.
- 5.3 Gravure Surface Preparation.
- 5.4 Quality Control Aids – Star Target, GATF Registration Mark, Dot Gain Scale, Colour Control Bar, Grey Scale, Plate Punching & Bending, Densitometer, etc.

TEXT BOOKS/REFERENCE BOOKS:

1. Gatehouse & roper, film assembly & plate making, gatf, usa.
2. Offset plate making, gatf, usa.
3. Mertle & others, photo mechanics & printing, vnr, usa.
4. Karch & buber, graphic arts procedures, american technical society, chicago, usa.
5. Machine printing, focal press, london
6. Lithographic image carriers, cs mishra, anupam prakashan
7. The image carrier technology handbook by j. m. adams
8. Image carrier technology by r. j. g. baldwin
9. Printing technology by j. m. adams
10. The coatings technology handbook by d. r. randell

INSTRUCTIONAL STRATEGY:

Understand the principles, materials, and applications of image carrier technology. Deliver lectures on the principles, materials, and applications of image carrier technology. Demonstrate hands-on techniques for creating and processing image carriers. Use industry-standard equipment and software to simulate real-world scenarios.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
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1	6	10
2	8	20
3	6	15
4	8	20
5	14	35
Total	42	100

4.6	FLEXOGRAPHY PRINTING (Theory)	L T P
		3 0 0

COURSE OBJECTIVES

This is a technology subject flexography process and technology. Technicians working printing industry are required to deal with different printing machines of various processes. These machines have different operational unit. The diploma holders are required good knowledge of these machines. This subject deals with the printing machines of all the process and their operational unites.

COURSE OUTCOMES (CO)

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1• Describe the introduction of flexography printing.

CO2• Different types of flexography image carrier preparation.

CO3• Identify the essential components of a flexographic press.

CO4• Learn about inking system, types of substrates, anilox roller and its types, plate mounting.

CO5• Different flexography printed products.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	-	*	*
CO2	3	2	-	-	-	-	-	*	*
CO3	3	-	-	-	-	-	-	*	*
CO4	3	-	-	-	-	-	-	*	*
CO5	3	1	-	-	-	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT 1- INTRODUCTION OF FLEXOGRAPHY:

(06Periods)

1.1 Introduction of flexography printing press.

1.2 Types of flexography printing press.

1.3 Future development of flexography plate.

1.4 Advantage, Limitations and characteristics of flexography process.

UNIT 2- FLEXOGRAPHY IMAGE CARRIER PREPARTION:

(12 Periods)

2.1 Structure of flexography plate metal backed plate magnetic plates.

2.2 Rubber plate making and their process.

2.3 Sheet polymer plate making and their process.

2.4 Liquid polymer plate making and their process.

2.5 Making multiple plates computer flexography plate, computer rubber making plate laser engraved rubber plate.

UNIT 3- MECHANICS OF FLEXOGRAPHY MACHINE:

(08 Periods)

- 3.1 Main section of flexo machine unwind section, printing section, drying section, rewind section.
- 3.2 Printing machines, operating mechanics, lubrication method.
- 3.3 Automatic web control, automatic machine running technique setting of pressure.
- 3.4 Doctor blade assembly, cleaning of ink tank.

UNIT 4- INKING SYSTEM, SUBSTRATES, ANILOX ROLLER AND PLATE MOUNTING (10 Periods)

- 4.1 Composition classification of flexography inks and solvents types of ink metering system.
- 4.2 Types of substrate use in flexography printing.
- 4.3 Anilox Roller and its type, types of anilox cells, cleaning system, specification, selection of suitable anilox roller.
- 4.5 Plate mounting system on flexography machine.
- 4.6 Corona treatment of flexo substrate.

UNIT 5- FLEXOGRAPHY PRODUCT AND MARKET

(06 Periods)

- 5.1 Other commercial flexography printing flexography packaging and converting.
- 5.2 flexography flexible packaging, labels, wrapper, decorative laminates and other products.

TEXT BOOKS/REFERENCE BOOKS

- 1 Flexography printing, C.S. Mishra, Anupam Prakashan, Allahabad.
- 2. Asia Pacific Business press.
- 3. NIIR Board of Consultant and engineers.

INSTRUCTIONAL STRATEGY

While imparting instructions teacher should show flexography printing machine and its parts and various type packaging materials print in flexography printing machine to the student. student should be asked flexography printing machine configuration and various parts. visit to industry should be planned to demonstrate use of various types of flexography printing processes in the industry.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	06	15
2	12	25
3	08	20
4	10	25
5	6	15

Total	42	100
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4.7.1	DIRECT SELLING (Theory)	L T P
		2 0 0

COURSE OBJECTIVES

Direct selling course objectives focus on equipping individuals with core sales skills like prospecting, building rapport, handling objections, closing deals, and customer retention, along with specific product knowledge, compliance (legal/ethical), communication, digital tools, and personal branding to excel as effective, ethical, and self-reliant sales professionals in the direct selling industry.

COURSE OUTCOMES(CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1•** Define the core concepts, principles, and nature of direct selling, including how it differs from traditional retail.
- CO2•** Know the different types of direct selling.
- CO3•** Create Extra earning source, business skills and multiple business strategies.
- CO4•** Different scopes and importance of direct selling.
- CO5•** Different advantages and limitations of direct selling.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	-	*	*
CO2	3	-	-	-	-	-	-	*	*
CO3	3	-	-	-	-	-	3	*	*
CO4	3	-	-	-	-	-	3	*	*
CO5	3	-	-	-	-	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT 1- Introduction of Direct Selling

(06 Periods)

Introduction and definition of direct selling, History of direct selling, Rules and guidelines of direct selling in India, Current status and development of direct selling in India & other countries.

UNIT 2- Types of Direct Selling

(06 periods)

Different types of direct selling e. g. single level selling, door to door selling, multi-level selling, party plan selling, online shopping, venue sales etc.

UNIT 3- Benefits of Direct Selling

(06 Periods)

3.1 Different benefits of Direct Selling.

3.2 Development of business skills, use of multiple business strategies.

UNIT 4- Scope and Importance of Direct Selling

(06 Periods)

4.1 Scope of direct selling in Indian market as well as International market.

4.2 Importance of Direct Selling and Empowerment of Entrepreneurs.

UNIT 5- Advantages and Limitations of Direct Selling

(04 Periods)

5.1 Different advantages of direct selling.

5.2 Different limitations of direct selling.

TEXT BOOKS/REFERENCE BOOKS:

- Direct Selling Kya kyo aur kaise by Kamal Narayan Sahu.
- Judo, Jodo, Jito by Dr. Ujjwal Patni.

- Direct selling ka vijeta kaise bane by Dr. Surendra Vats.
- Direct Selling : beginning of a viral Era by Sanjeev Prajapati
- Safalta ke 24 adhyay by Sonu Sharma.

INSTRUCTIONAL STRATEGY

Begin with selling product information to familiarize students with Direct Selling. Provide hands-on exercises and must promote to attend at least two big seminars for making projects covering direct selling and network marketing. Foster peer collaboration through group projects and critique sessions to encourage feedback and learning from peers. Offer opportunities for independent exploration and experimentation to encourage creativity and problem-solving skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	6	20
2	6	22
3	6	22
4	6	22
5	4	14
Total	28	100

4.7.2	RIGID PACKAGING (Theory)	L T P
		2 0 0

COURSE OBJECTIVES

Understanding the properties and characteristics of different rigid packaging materials like plastics, metals, glass, and paperboard. Exploring the advantages and disadvantages of each material in terms of barrier properties, strength, sustainability, and cost. Developing a solid understanding of design principles for rigid packaging, including ergonomics, aesthetics, and functionality. Learning how to design packaging that protects products, meets regulatory requirements, and enhances brand identity. Exploring sustainable packaging practices, including the use of recycled materials, renewable resources, and biodegradable packaging.

COURSE OUTCOMES(CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1• Basic knowledge of packaging technology and difference between rigid vs. flexible packaging.

CO2• Overview of different rigid packaging material.

CO3• Different rigid packages manufacturing process.

CO4• Learn about design of rigid packaging and different testing method.

CO5• Environmental impact of rigid packaging.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	2	*	*
CO2	3	-	-	-	-	-	-	*	*
CO3	3	-	-	-	-	-	-	*	*
CO4	3	-	-	-	-	-	-	*	*
CO5	3	-	-	-	2	-	-	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS**UNIT 1- INTRODUCTION TO PACKAGING TECHNOLOGY** (04 Period)

1.1 Definition and scope of packaging, functions of packaging, Classification: Primary, secondary, tertiary, introduction to rigid vs. flexible packaging, trends in packaging industry.

UNIT 2- RIGID PACKAGING MATERIALS: (06 Period)

2.1 Overview of rigid materials, plastics: HDPE, PET, PP, PS – properties and uses, Glass: Types of glass, advantages, limitations • Metals: Tinplate, aluminium, steel – properties and packaging applications.

UNIT 3- MANUFACTURING PROCESSES FOR RIGID PACKAGES (06Period)

3.1 Plastic Containers: Injection moulding, blow moulding (extrusion and injection stretch), glass Containers: Glass blowing, forming techniques, metal containers: Can making, welding, seaming ,Quality control during manufacturing.

UNIT 4- DESIGN AND TESTING OF RIGID PACKAGING (06Period)

4.1 Structural and graphic design principles, Ergonomics and consumer usability, Standard tests: Drop test, compression, leak test, burst strength, etc., Compatibility testing with contents, Case studies.

UNIT 5- SUSTAINABILITY AND REGULATIONS (06 Period)

5.1 Environmental impact of rigid packaging, Recyclability and biodegradability, Food and pharmaceutical packaging regulations, ISO, ASTM, BIS standards relevant to rigid packaging, Packaging waste management rules

TEXT BOOKS

- 1 Rigid Plastics Packaging: Materials, Processes and Applications by F. Hannay
2. Food Packaging Technology Handbook (3rd Revised Edition).
3. Hand Book of Packaging Technology by Engineers India Research Institute (EIRI)

4. Fundamentals of Packaging Technology – S. Natarajan, M. Govindarajan.
5. Packaging Technology – Volume I – IIP
6. Packaging Technology – Volume II – IIP

INSTRUCTIONAL STRATEGY

An instructional strategy for rigid packaging should emphasize the design considerations for recyclability, ease of disposal, and consumer education. This includes minimizing components, providing clear disposal instructions, and choosing inks that are safe and easily removed during the recycling process.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	4	12
2	6	22
3	6	22
4	6	22
5	6	22
Total	28	100

4.8	ESSENCE OF INDIAN KNOWLEDGE AND TRADITION	L T P
		2 0 0

COURSE OBJECTIVE:

Understand the fundamental aspects of the Indian Knowledge System, its integration with modern science, principles of Yoga and holistic healthcare, and practical applications in contemporary contexts.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to demonstrate knowledge of the following topics:

CO1: Overview, importance, and relevance of the Indian Knowledge System, including Vedas, Upavedas, Vedangas, and Upangas.

CO2: Relevance of science and spirituality, and contributions of ancient Indian science and technology.

CO3: Basic principles of Yoga, benefits of holistic healthcare, and integration with modern healthcare.

CO4: Practical applications and case studies of the Indian Knowledge System's relevance today.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Engineering Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	1	1	1	2	1	3	*	*
CO2	3	2	2	1	3	1	3	*	*
CO3	3	2	2	1	3	1	3	*	*
CO4	3	2	3	2	3	2	3	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

Unit 1: Introduction to Indian Knowledge System

(07 Periods)

Overview of Indian Knowledge System

- Importance and relevance
- Introduction to the Vedas
- Upavedas
- Vedangas
- Upangas

Unit 2: Modern Science and Indian Knowledge System

(07 Periods)

- Relevance of Science and Spirituality,
- Science and Technology in Ancient India,

Unit 3: Yoga and Holistic Healthcare

(07 Periods)

- Basic principles of Yoga
- Benefits of holistic healthcare practices
- Integration with modern healthcare

Unit 4: Case Studies / Assignment

(07 Periods)

- Practical Applications / Case studies demonstrating the relevance of Indian Knowledge System in modern times

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	07	40
2.	07	30
3.	07	15
4.	07	15
Total	28	100

5.1	GRAVURE PRINTING (Practicum)	L T P
		2 0 4

COURSE OBJECTIVES

This is a subject of gravure process and technology. Technicians working in printing industry are required to deal with different printing machines of various job. These machines have different operational unit. The diploma holders are required good knowledge of these machines. This subject deals with the printing machines of all the process and their operational units.

COURSE OUTCOMES (CO):

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1• Basics knowledge of gravure printing, gravure products and make ready of gravure press.

CO2• Gravure image carrier technology and their preparation.

CO3• Learn about gravure press components, doctor blade, printing defects and web loading / unloading.

CO4• Learn about impression rollers, make ready and proffing process.

CO5• Application of gravure ink dryers and color mixing matching.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	2	*	*
CO2	3	-	-	-	-	-	-	*	*
CO3	3	-	-	-	-	-	-	*	*
CO4	3	-	-	-	-	-	-	*	*
CO5	3	-	-	-	-	-	-	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT -1 HISTORY OF GRAVURE, GRAVURE PRODUCTS AND MARKETS (04 Periods)

- 1.1 Invention of Intaglio/ gravure, Chemical Etching, Popularity of engraving.
- 1.2 Cylinder printing, Impression cylinder, first rotary gravure press, advanced in engraving.
- 1.3 Publication gravure, Gravure magazine printing, other commercial gravure printing, gravure packaging and converting.
- 1.4 Gravure flexible packaging, Gravure labels and wrapper, other gravure printed products.

Ex. No.	Name of Experiment	Periods
1	Introduction make ready of gravure press	8

UNIT -2 GRAVURE CYLINDERS ENGRAVING**(06 Periods)**

- 2.1 Conventional etch, Direct transfer method, chemical engraving method and equipment, Cell configurations.
- 2.2 Merits and limitations of chemical etching, photo and digital proofs for gravure.
- 2.3 Soft copy proofs, Overlay proofs, Single sheet proofing system, direct digital proof.
- 2.4 Gravure press proofs, Register control on proofs presses, cylinder correction method.

Ex. No.	Name of Experiment	Periods
1	Cylinder loading and unloading gravure press.	12

UNIT -3 THE GRAVURE PRESS AND ITS COMPONENTS & PRINTING DEFECT, GRAVURE DOCTOR BLADE:**(06 Periods)**

- 3.1 A Generic printing press, packaging gravure press, offset gravure and flexo gravure.
- 3.2 Printing defects, Line, Stick, Scum, Image blind, cell filling, mottling, adhesion problem, setoff,
- 3.3 The doctor blade assembly, Doctor Blade wear, Doctor Blade materials.
- 3.4 Doctor blade holder configurations, Blade setting procedures, Blade edge configurations.
- 3.5 Preparing blade for use, make ready and trouble- shooting, Doctor Blade problems

Ex No	Name of Experiment	Periods
1	Doctor Blade setting procedures,	6
2	Web loading and unloading on gravure printing machine.	6

UNIT -4 THE GRAVURE IMPRESSION ROLLER**(06 Periods)**

- 4.1 Functions of the impression roller, Roller coverings, Roller pressure, Effects on web.
- 4.2 Cylinder diameter, Roller design and configurations, Roller setting, Impressions mechanism.
- 4.3 Impressions rollers problems, Impressions rollers effects on web tension, Electrostatic assist.

Ex. No.	Name of Experiment	Periods
1	Make ready and proofing gravure press	12

UNIT -5 GRAVURE INK DRYERS**(06 Periods)**

- 5.1 The need for ink dryers, Solvent removal, Drying water base inks, Dryers functioning.
- 5.2 Heat sources, other drying methods, Environmental considerations, Accountability for solvents.

Ex. No.	Name of Experiment	Periods

1	Color matching and mixing gravure press	12
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TEXT BOOKS / REFERENCE BOOKS

- 1 ASIA PACIFIC BUSINESS PRESS.
- 2 NIIR BOARD OF CONSULTANTS AND ENGINEERS.

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should show gravure printing machine and various packaging materials print in gravure printing machine to the student. Student should be asked gravure printing machine configuration and various parts. Visits to industry should be planned to demonstrate use of various types of gravure printing processes in the industry.

5.2.1	BOOK PUBLISHING (Theory)	L T P
		3 0 0

COURSE OBJECTIVES

This is an important subject of printing and publishing industry. It is essential for students to learn about the basics of various publishing companies and working of e- publishing. The diploma holders are required good knowledge of these publication work in the field of printing technology.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1• Different parts of the book and introduction to book publishing.
- CO2• Editorial work of book publishing and industry flowchart.
- CO3• Production and estimation in book publishing.
- CO4• Marketing and Distribution channels in publishing
- CO5• Legal aspects of book publishing

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
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	Knowledge				and Environment				
CO1	3	-	-	-	-	-	-	*	*
CO2	3	-	-	-	-	-	2	*	*
CO3	3	-	-	-	-	-	2	*	*
CO4	3	-	-	-	-	-	2	*	*
CO5	3	-	-	-	-	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT 1- BOOK PUBLISHING

(8 periods)

1.1 Definition and concept, parts of a book, basic steps in book publishing

1.2 Areas of publishing - general publishing, educational publishing, professional publishing and reference publishing. Publishing house - the role of commissioning editor, the desk editor, the designer, the production manager, the sale/marketing manager, the publicity manager, the warehouse or distribution department, the accounts department, the management.

UNIT 2- Press Organization

(8 periods)

2.1 Hierarchy - editorial organization, mechanical aspects of organization - composition, printing, basic operations business aspects of organization,

2.2 Flowcharts of staff in organization, Circulation and Advertisement departments, distribution channels.

UNIT 3-Production & Estimating in Book Publishing

(10 periods)

3.1 First copy cost, manufacturing cost, overheads.

3.2 Economic of publishing - Net book, non-net book, variations in price of same size books, published price of book.

3.3 Technical aspects of production from receipt of manuscript to completion of book, gestation period, calculating break-even point.

UNIT 4 - Marketing and Distribution in Book Publishing

(8 periods)

4.1 Home market, export market, closed market, advertising and publicity.

4.2 Types of distribution, conventional and modern channels of distribution. International book trade and barriers.

4.3 Import and export of books. Relationship of the Editor with the manuscript. Evaluation procedures. External review and its associated problems.

UNIT 5- Legal Aspects in book publishing

(8 periods)

- 5.1 Copyright, types of agreement between author and publishers the outright sale of the copyright, profit sharing agreement.
- 5.2 The royalty system, commission agreements The press and the law-libel, defense against libel, mitigation & damages.
- 5.3 Importance and need of subsidy in the publication of books.
- 5.4 Salient features of the subsidy scheme. Procedure of getting subsidy.

TEXT BOOKS / REFERENCE BOOKS

1. Printing Technology, Adam Fox
2. Book Publishing- Frank

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should show some practical on different types of machines. Visit to publication industry should be planned for learning of editing work and production processes of book binding and book publication.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	8	20
2	8	20
3	10	20
4	8	20
5	8	20
Total	42	100

5.2.2	SECURITY PRINTING (Theory)	L T P
		3 0 0

COURSE OBJECTIVES:

Define security printing, its importance, and applications. Identify and describe various security features used in security printing, such as watermarks, holograms, and micro printing. Understand the different technologies used in security printing, including intaglio, offset, and digital printing. Learn about the different types of security paper and substrates used in security printing. Apply security features and design principles to create secure documents, such as banknotes, passports, and ID cards. Use knowledge and skills to address real-world security printing challenges and scenarios.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1• Understand security printing fundamentals.
- CO2• Identify security features and familiarize with security printing technologies.
- CO3• Knowledge of security paper and substrates.
- CO4• Knowledge about security printing presses, materials and quality aspects.
- CO5• Understand future of security printing.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	-	*	*
CO2	3	-	-	-	-	-	-	*	*
CO3	3	-	-	-	-	-	-	*	*
CO4	3	3	2	2	-	-	-	*	*
CO5	3	1	-	-	-	-	3	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT -1 INTRODUCTION TO SECURITY PRINTING (08 Periods)

- 1.1 Definition and importance of security printing.
- 1.2 History and evolution of security printing.
- 1.3 Applications of security printing (banknotes, passports, ID cards, etc.)

UNIT -2 SECURITY FEATURES AND TECHNOLOGIES (08 Periods)

- 1.1 Types of security features (watermarks, holograms, micro printing, etc.)
- 1.2 Security printing technologies (intaglio, offset, digital, etc.)
- 1.3 Advanced security features (nanotechnology, DNA marking, etc.)

UNIT -3 SECURITY PAPER AND SUBSTRATES (08 Periods)

- 3.1 Types of security paper (cotton, linen, polymer, etc.)
- 3.2 Security features in paper (watermarks, security threads, etc.)
- 3.3 Alternative substrates (plastics, composites, etc.)

UNIT -4 SECURITY PRINTING EQUIPMENT, MATERIALS AND QUALITY ASPECTS (10 Periods)

- 4.1 Security printing presses (intaglio, offset, digital, relief, etc.)
- 4.2 Ink, toner, and other security printing materials.
- 4.3 Quality control and quality assurance in security printing

UNIT -5 FUTURE OF SECURITY PRINTING (08 Periods)

- 5.1 Emerging trends and technologies in security printing.
- 5.2 Future challenges and opportunities in security printing.
- 5.3 Strategic planning for security printing organizations.

TEXT BOOKS / REFERENCE BOOKS:

- 1. Introduction to Security Printing by Richard D. Warner and Dr. Richard M. Adams.
- 2. The Complete Book on Printing Technology with Process Flow Diagrams by NIIR Board
- 3. Security printing The Ultimate Step-By-Step Guide by Gerardus Blokdyk.
- 4. Encyclopedia of Brand Protection and Security Printing Technology by Michael Fairley & Jeremy Plimmer.

INSTRUCTIONAL STRATEGY

Provide an overview of security printing concepts, technologies, and applications. Use real-world examples to illustrate security printing principles and challenges. Provide students with hands-on experience in designing and producing secure documents.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	8	19
2	8	19
3	8	19
4	10	24
5	8	19
Total	42	100

5.2.3	PRINT PRODUCTION PLANNING AND CONTROL	L T P
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COURSE OBJECTIVES

A Production Planning and Control (PPC) course aims to equip students with the knowledge and skills to manage and optimize the production process, ensuring timely delivery, efficient resource utilization, and reduced costs. Course objectives include understanding PPC concepts, applying forecasting techniques, solving scheduling problems, and integrating different functional areas to execute PPC functions.

COURSE OUTCOMES (CO)

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1• Recognize the objectives, functions, applications of PPC.
- CO2• Methods of costing and estimating.
- CO3• Solve routing and scheduling problems.
- CO4• Summarize various production control techniques.
- CO5• Learn about tools (softwares) and new technologies in production control..

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	-	*	*
CO2	3	-	-	-	-	-	2	*	*
CO3	3	-	-	-	-	-	-	*	*
CO4	3	-	-	-	-	-	2	*	*
CO5	3	-	-	-	-	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT -1 INTRODUCTION TO PRINT PRODUCTION PLANNING (08 Periods)

- 1.1 Importance and objectives of production planning
- 1.2 Functions and responsibilities of the planning department
- 1.3 Types of printing workflows: Offset, Digital, Flexographic, Gravure Organizational structure in a printing unit

UNIT -2 ESTIMATION AND COSTING

(10 Periods)

- 2.1 Principles of cost estimation
- 2.2 Cost elements: material, labour, overheads
- 2.3 Estimating methods for prepress, press, and post-press Budgeting and pricing strategies.

UNIT -3 ROUTING AND SCHEDULING

(08 Periods)

- 3.1 Routing Definition, procedure, Route sheets, Bill of material, Factors affecting routing procedure.
- 3.2 Scheduling Definition, activities, difference with loading, scheduling types: forward and backward, job shop scheduling methods – arrival pattern and processing pattern.

UNIT -4 PRODUCTION CONTROL TECHNIQUES

(08 Periods)

- 4.1 Quality control methods in print production
- 4.2 Inventory control: types and techniques (JIT, EOQ)
- 4.3 Waste management and reduction strategies

UNIT -5 TOOLS AND TECHNOLOGIES IN PRINT PRODUCTION

(08 Periods)

- 5.1 Software used in planning and scheduling (MIS, ERP, scheduling tools)
- 5.2 Automation in production control
- 5.3 Use of barcodes, RFID, and tracking systems

TEXT BOOKS / REFERENCE BOOKS:

1. "Production Planning and Control" – S.C. Sharma
2. "Print Production Management" – Dr. N. N. Sarkar
3. "Print Production Handbook" – Michael Barnard
4. "Production and Operations Management" – K. Aswathappa & K. Shridhara Bhat
5. "Print Media Production" – Helmuth Kipphan
6. "Handbook of Print Media: Technologies and Production Methods" – Helmut Kipphan
7. "Cost Estimating for Graphic Arts and Printing" – Philip K. Ruggles

INSTRUCTIONAL STRATEGY

A successful instructional strategy for print production planning and control emphasizes practical application and real-world scenarios, incorporating diverse learning methods like simulations, case studies, and hands-on activities. This approach ensures learners understand the concepts and can apply them effectively in various print production settings.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	08	19
2	10	24
3	08	19
4	08	19
5	08	19
Total	42	100

5.3	PRINTING COSTING AND ESTIMATING (Theory)	L T P
		4 0 0

COURSE OBJECTIVES:

To give comprehensive knowledge of concepts of costing and estimation in printing organizations. By optimizing resource utilization and reducing waste, organizations can improve productivity and increase profitability. To provide knowledge of various mathematical tools and techniques for costing and estimation of raw material consumption. Scientific estimating can enable to forecast correctly and judiciously the estimated cost of jobs. Implement efficient production workflows, continuously monitor and control costs to ensure that printing solutions meet client needs and budget constraints. Enable to provide accurate quotes and proposals, combined with cost-effective printing solutions, can gain a competitive advantage in the market.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1• Understand the introduction of costing and estimating.
- CO2• Define different elements of cost.
- CO3• Use of various forms, proforma and softwares.
- CO4• Calculating estimation of different production materials.
- CO5• Understand legal aspects and technical specifications.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	-	*	*
CO2	3	-	-	-	-	-	-	*	*
CO3	3	2	-	2	-	-	2	*	*
CO4	3	3	-	-	-	-	2	*	*
CO5	3	2	-	-	-	-	3	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT -1 COSTING AND ESTIMATING

(08 Periods)

- 1.1 Cost, Price and Profit.
- 1.2 Concept of Costing and Estimating, difference between costing and estimating, relationship between costing and estimating.
- 1.3 Purpose and function of costing, purpose and function of estimating.
- 1.4 Outline of British Federation system of costing.

UNIT -2 ELEMENTS OF COST

(14 Periods)

- 2.1 Various elements of cost- Directly chargeable cost and indirectly chargeable cost, Labour, Material and Outwork.
- 2.2 Costing system- Aim and objective, types of costing system.
- 2.3 Study of factors affecting profitability and pricing policy, study of cost control system, cost reduction and cost recovery.
- 2.4 Study of hourly cost rate, machine cost rate and their applications in costing, study of approaches of allocation of expenses.
- 2.5 Fixed cost and variable cost, unit cost, cost effectiveness.
- 2.6 Assessment of capital values, forecasting the life of assets methods of depreciation.

UNIT -3 FORMS AND PERFORMA

(10 Periods)

- 3.1 Standard press routine and its advantages.

- 3.2 Various forms and proforma and their importance.
- 3.3 Printer's Estimator- qualifications of an estimator, working environment, estimator's tools.
- 3.4 Introduction to costing and estimation software, Print production planning software, facilities, Advantages and Limitations, Data base printing management system.

UNIT -4 ESTIMATING

(16 Periods)

- 4.1 Estimation of paper-paper size (British & ISO), GSM, selection of paper, wastage allowance, weight of web & sheets, calculation of no. of pages, weight of a reel of flexible material with formula derivation, equivalent weight, estimating flexible materials.
- 4.2 Determination of rate for design and DTP.
- 4.3 Estimating for various method of image carrier preparation (conventional and latest printing processes).
- 4.4 Ink consumption formula for mono colour and four process colour printing, ink allowance for spoilage.
- 4.5 Estimating Binding Materials: Board requirement, estimating covering materials, estimating sewing thread, estimating stitching wire and estimating adhesives.

UNIT -5 LEGAL ASPECTS

(08 Periods)

- 5.1 Liability, customer's property, terms, disputes about cost variation & delayed payments, taxes, variation in quantity, local organization & rules.
- 5.2 Study of technical specifications, tender, formats of tender documents, bid, quotation, GST, excise, freight charges, penalty clause, TDS, etc.

TEXT BOOKS / REFERENCE BOOKS:

1. Costing and estimating for printers - by B. D. Mendiratta.
2. Computer-aided Estimating- Graphi Arts Technical Foundation, Pittsburgh, USA.
3. Cost Accountancy for printers, British Printing Industries Federation, Landon.
4. Estimating for Printers, British Printing Industries Federation, Landon.
5. Estimating Methods and cost analysis for printers, Balaraman and Krishnamurthy, Ramya Features, Chinnai.
6. Principles of applied costing for printing industry, K.S. Venkatraman, AIFMP, New Delhi.
7. Lagat Parikalan tatha Mulyankan, L.R. Nagpal, NeelamPrakashan, Chandigarh.
8. Mudran Samagri Prodyogiki, M.N. Lidbide, Madhaya Pradesh Hindi Granth, Academy Bhopal.

INSTRUCTIONAL STRATEGY

Provide students with estimating exercises to practice calculating costs and preparing quotes. Use simulations to model real-world costing scenarios, allowing students to experiment with different variables. Utilize online tutorials and videos to supplement lectures and provide additional learning resources. Use industry-standard estimating software to teach students how to prepare accurate quotes and estimates. Invite industry professionals to share their experiences and insights on costing and estimating in the printing industry.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	08	15
2	14	25
3	10	20
4	16	25
5	08	15
Total	56	100

5.4.1	MACHINE MAINTENANCE (Practical)	L T P
		0 0 4

COURSE OBJECTIVES:

The objective of this course is to enable the students to identify and describe the major components of printing machines, including infeed, ink systems, and outfeed systems. Understand the routine maintenance procedures for printing machines, including daily, weekly, and monthly tasks. Develop skills in troubleshooting common printing machine problems, including ink flow issues, paper jams, and print quality problems. Follow up with safety procedures for working with printing machines, including lockout/tag out procedures and personal protective equipment. Develop a preventive maintenance schedule for printing machines, including routine maintenance tasks and replacement of worn or damaged parts.

COURSE OUTCOMES (CO):

The practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1 • Demonstrate the ability to perform routine maintenance tasks, including cleaning and lubricating moving parts.
- CO2 • Develop a safety-first attitude when working with printing machines, including following safety procedures and wearing personal protective equipment.
- CO3 • Develop skills in troubleshooting and repairing common printing machine problems.
- CO4 • Demonstrate the ability to replace worn or damaged parts, including print heads, ink cartridges, and paper handling components.
- CO5 • Develop skills in calibrating printing machines, including impression setting, infeed setting, outfeed setting and ink flow calibration.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
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	Knowledge				and Environment				
CO1	3	-	-	-	-	-	-	*	*
CO2	3	-	-	-	-	-	-	*	*
CO3	3	2	-	-	-	-	-	*	*
CO4	3	2	2	-	-	-	-	*	*
CO5	3	2	3	-	-	-	-	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

LIST OF EXPERIMENT:

Ex. No.	Name of Experiment	Hours
1	Clean the printing machine, including the exterior and interior, to prevent dust and dirt buildup.	04
2	Lubrication of gear, chain, bearing and other moving parts.	04
3	Inspect and replace worn belts (including drive belts and timing belts), gear, chain and pulley to prevent machine damage.	06
4	Maintenance of cams, grippers on offset printing machine	04
5	Check and adjust hydraulic systems, including pumps and motors to ensure proper machine function.	06
6	Maintenance and impression setting of cylinders.	06
7	Check and adjust electrical systems, including wiring and circuits, to ensure proper machine function.	04
8	Perform calibration tasks, including calibrating sensors and actuators, to ensure proper machine function.	04
9	Maintenance of inking and dampening system including rollers and bearings.	06
10	Maintenance of feeding unit of the machine.	04
11	Maintenance of delivery unit of the machine.	04
12	Develop a preventive maintenance schedule for printing machines, including routine maintenance tasks and replacement of worn or damaged parts.	04

5. INSTRUCTIONAL STRATEGY

Provide an overview of printing machine maintenance, including the importance of routine maintenance and the major components of printing machines. Demonstrate routine maintenance tasks, including cleaning and lubricating moving parts, and provide hands-on practice for students. Troubleshoot and repair common printing machine problems. Develop a safety-first attitude when working with printing machines, including following safety procedures and wearing personal protective equipment.

5.4.2	DIGITAL PRINTING (Practical)	L T P
		0 0 4

COURSE OBJECTIVES:

The objective of this course is to enable the students to explain the principles and technologies used in digital printing. Describe the different digital printing processes, including inkjet, laser, and toner-based printing. Identify and describe the various materials used in digital printing, including papers, inks, and toners. Understand the importance of colour management in digital printing and explain the different colour models and spaces. Prepare digital files for printing, including formatting and converting files to the correct format. Troubleshoot common digital printing issues, including print quality problems.

COURSE OUTCOMES (CO):

The practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1• Explain the principles and technologies used in digital printing including inkjet, laser, and toner-based printing.
- CO2• Understand the different software and workflows used in digital printing, including RIP software and workflow management systems.
- CO3• Design materials for digital printing, including selecting the correct paper and ink.
- CO4• Evaluate the quality of digital prints, including assessing colour accuracy and print resolution.
- CO5• Develop a problem-solving mindset, including being able to troubleshoot and resolve digital printing issues.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	-	*	*
CO2	3	3	-	-	-	-	-	*	*
CO3	3	1	-	-	-	-	-	*	*
CO4	3	2	2	-	-	-	-	*	*
CO5	3	2	-	-	-	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

LIST OF EXPERIMENT:

Ex. No.	Name of Experiment	Hours
1	Digital printing workflow from file preparation to final print	04
2	Colour management in Digital Printing	08
3	Troubleshoot common digital printing issues	08
4	Evaluate the quality of digital prints	06
5	Digital printing software, including RIP software and workflow management systems	08
6	Variable data printing (VDP) and its applications	08
7	Specialty digital printing applications, such as label printing and textile printing	08
8	Digital printing maintenance and repair procedures	06

INSTRUCTIONAL STRATEGY

Provide an overview of digital printing technologies and processes, and demonstrate digital printing equipment and software. Provide students with hands-on experience in operating digital printing equipment and software. Provide students with access to digital printing equipment and software. Utilize online resources, such as tutorials and videos, to supplement instruction.

5.4.3	COLOUR SEPARATION TECHNOLOGY (Practical)	L T P
		0 0 4

COURSE OBJECTIVES:

The objective of this course is to enable the students to learn the fundamentals of colour theory, including colour models, colour spaces, and colour reproduction. Understand the principles of colour separation, including additive and subtractive colour mixing. Learn various colour separation techniques, including manual and automatic methods. Understand the importance of colour management in colour separation, including colour profiling and calibration.

COURSE OUTCOMES (CO):

The practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1• Demonstrate the ability to perform colour separation using various techniques and software.
- CO2• Apply colour correction techniques to ensure accurate colour reproduction.
- CO3• Create and evaluate colour proofs, including soft and hard proofs.
- CO4• Evaluate and control colour quality, including colour accuracy and consistency.
- CO5• Troubleshoot colour errors and inconsistencies in colour separation.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	-	*	*
CO2	3	2	-	2	-	-	-	*	*
CO3	3	2	-	3	-	-	1	*	*
CO4	3	3	3	-	-	-	2	*	*
CO5	3	2	2	-	-	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

LIST OF EXPERIMENT:

Ex. No.	Name of Experiment	Hours
1	Colour Separation using Different Software	08
2	Colour Separation for Different Printing Processes	08
3	Colour Correction and Colour Management	06
4	Colour Separation for Digital Media	06
5	Colour Separation using Advanced Techniques	06
6	Separations through scanner a colour scanner and evaluation	06
7	Use of Grey Scale, Densitometer & Spectrophotometer	08
8	Study of Density Range, Contrast, Gamma, Characteristic Curve	08

INSTRUCTIONAL STRATEGY

Provide an overview of colour separation principles and demonstrate colour separation techniques using different software. Provide students with hands-on experience in colour separation using different software and techniques. Provide students with access to colour separation software, such as Adobe Photoshop and Illustrator. Utilize online resources, such as tutorials and videos, to supplement instruction. Provide students with colour separation guides and templates to aid in their learning.

5.5	ADVANCED PRINTING TECHNOLOGIES (Theory)	L T P
		3 0 0

COURSE OBJECTIVES

To give knowledge of recent advancements in printing technologies. To impart knowledge of emerging printing processes and technologies used in printing industries. Explore the capabilities and applications of advanced printing. Ability to design files for advanced printing technologies, including digital printing. To give knowledge about advanced method and operations used in printing industries. Ability to improve printing efficiency by optimizing printing processes and reducing waste. Ability to enhance print quality by selecting appropriate printing technologies and optimizing printing parameters.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1• Understanding of digital printing technologies.
- CO2• Aware of non impact printing technologies in the industry.
- CO3• Aware of advanced security feature for security printing.
- CO4• Knowledge of some special printing technologies.
- CO5• Aware of emerging trends and technologies in the printing industry.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	2	*	*
CO2	3	-	-	-	-	-	-	*	*
CO3	3	-	-	-	-	-	3	*	*
CO4	3	-	-	-	-	-	2	*	*
CO5	3	-	-	-	-	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT -1 DIGITAL PRINTING TECHNOLOGIES

(06 Periods)

1.1 Definition, Scope and job suitability of Digital printing process.

1.2 Computer-to-Press – Working principle of Direct Imaging with once imageable master and Working principle of Direct Imaging with re-imageable master.

1.3 Computer-to-Print – Working principle.

UNIT -2 NON-IMPACT PRINTING TECHNOLOGIES

(10 Periods)

2.1 Principle of Non-impact printing technology, applications of NIP technology.

2.2 Principle of Non-impact printing technology, Flow chart of NIP technology and Applications of NIP technology and its applications.

2.3 Principle of Iconography – Imaging, Developing, Toner transfer, Toner fixing, Cleaning and Erasing and its applications.

2.4 Principle of Thermography – Direct thermography, transfer thermography, Working principle of thermal transfer and thermal sublimation printing systems, thermographic ink tonner properties.

2.5 Principle of Ink jet printing - Working principles of continuous ink jet, drop on demand ink jet printing and its applications.

UNIT -3 SECURITY PRINTING TECHNOLOGY

(08 Periods)

3.1 Security design features - Pantograph screens, Void pantograph screen, ODT - optical deterrent technology, Guilloches, Warning bands, Code safe, High resolution graphics, Padlock icon and application of security printing.

3.2 Security papers – Safety paper, Chemical reactive paper, Water mark paper and Copy evident paper

3.3 Security inks – Trademark colours, Colour changing ink, Magnetic ink, copy protection ink, Erasable ink, Fugitive ink, Pen reactive ink, Heat reactive ink, Coin reactive inks, Migrating ink, Bleeding inks, Florescent ink, Metallic ink and UV ink.

3.4 Security threads and Watermark.

UNIT -4 SPECIAL PRINTING TECHNOLOGIES

(10 Periods)

4.1 Basic principles of hybrid printing system and its applications.

4.2 Principles of holograms making process, Components and steps of hologram making system.

4.3 Principles of Lenticular printing process.

4.4 Waterless offset printing and its applications.

4.5 Green Printing, Augmented Reality (AR), DI presses.

UNIT -5 EMERGING PRINTING PROCESS

(08 Periods)

5.1 Introduction about 3D printing, Types of 3D printing and applications of 3D Printing.

5.3 Internet of Things (IoT) – Concept, application and scope of IoT in printing.

5.4 Basic principles of E-book, application of E-book, Principles of E-ink and its applications.

5.5 Introduction about customized printing and applications.

TEXT BOOKS / REFERENCE BOOKS:

1. Dr. K.L. Mittal and Dr. V.K. Khanna, Advanced Printing Technologies, Mittal Publications (India), 2nd Edition (2003).
2. Prof. Dr. Helmut Kippam, Handbook of Print Media by Springer.
3. Michael R. Shannon, The Encyclopedia of Printing and Graphic Arts, Garland Publishing, 1996.
4. Michael Kriss, Handbook of Digital Imaging, Wiley Publication, 2015.
5. James E. Sutherland, Printing Technology, Thomson Learning, 2001.

6. Michael Foley & David Inkjet, Handbook of Digital Printing, Elsevier Science & Technology, 2003.

INSTRUCTIONAL STRATEGY

Provide students with hands-on experience with advanced printing equipment and technologies. Include practical exercises and projects that allow students to apply theoretical knowledge. Utilize online tutorials and videos to supplement lectures and provide additional learning resources. Use real-world examples and case studies to illustrate advanced printing technologies and their applications. Invite industry experts to share their experiences and insights on advanced printing technologies.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	06	10
2	10	25
3	08	20
4	10	25
5	08	20
Total	42	100

5.6.1	AI & ML (Practicum)	L T P
		1 0 3

COURSE OBJECTIVE

This course is designed to equip students with essential theoretical and practical skills need for understanding the requirements, collection of data, pre-processing of data, building and deploying machine learning and artificial intelligence solutions to real world applications. Participants will gain hands-on experience with the latest software, enabling them to adopt latest technologies in line with industry requirements and building competency in the Machine Learning and Artificial Intelligence field.

COURSE OUTCOME

- Understand the fundamentals of Machine Learning and AI and their practical applications.
- Understanding of Basic Mathematical Concepts used in AI and ML.
- Understand Data Collection and Data Pre-Processing.
- Understand Basics of AI and Machine Learning
- Develop python programming skills for Machine Learning and AI.

- Understand the role of Supervised, Unsupervised and Deep Learning in real world applications.
- Select appropriate Machine Learning Algorithm for specific applications.
- Implementation of Regression Analysis for Prediction.
- Train a logistic regression model for binary classification.
- Train and Evaluate SVM for classification.
- Implementation of Decision Tree Machine Learning Model.
- Implement K – Means clustering.
- Build Supervised Machine Learning Model.
- Build Unsupervised Machine Learning.
- Build Reinforcement Machine Learning Model.
- Train a convolutional network (CNN) for image classification task.
- Evaluate Machine Learning Model.
- Deployment of Machine Learning Model.
- Understand Ethical challenges in AI and ML
- Understand importance of Data Protection.
- Understand social impact of AI.
- Evaluate the responsibility and accountability of AI systems.
- Familiarize with key ethical frameworks and guidelines governing AI deployment.

COURSE CONTENTS

1 Industrial Safety Practices

- Fire Extinguishers & its Types
- Safely handling Tools & Equipment
- Use of proper Tools & Equipment & its maintenance
- OSH & practices to be observed as a precaution

2 Fundamentals required for AI and ML

- Introduction to Artificial Intelligence and Machine Learning
- Need of AI and ML
- Basic Mathematical concepts related to AI and ML
- Data Collection, Data Processing and Cleaning
- Types of Data Sources
 - Structured Data
 - Unstructured Data
 - Semi Structured
 - Realtime Data
 - Open Data Set
 - Data Scraping

- Data Acquisition Techniques
 - APIs (Application Programming Interfaces): Collection of from External Sources)
 - Web Scrapping
 - Surveys and Forms
 - Sensor Data
 - Database and Data Warehouse
- Data Integration
 - Combining Data from Multiple Sources
 - Data Merging (Combing Data from different Tables)
 - Data Aggregation
- Data Pre-Processing
 - Data Cleaning
 - Outlier Detection and Removal
 - Duplicate Data

3 **Programming concepts for AI and ML**

- Python Basics
- Python Structure
- NumPy
- Pandas
- Matplotlib and Seaborn
- Scikit-learn

4 **Introduction to Supervised Machine Learning**

Types of Machine Learning Techniques (Supervised, Unsupervised and Reinforcement Learning)

- Supervised Learning
 - Regression
 - Classification
 - Logistic Regression
 - Support Vector Machines
 - Decision Tree
 - Random Forest
 - K – Nearest Neighbors (KNN)
 - Use cases of Regression and Classification

5 **Introduction to Unsupervised Learning**

- Clustering
 - K – Means Clustering
 - Hierarchical Clustering
 - DBSCAN
- Dimensionality Reduction
- Anomaly Detection
- Use cases of clustering and Dimensional Reduction
- Building Machine Learning Model

- Model Evaluation and Validation
- Machine Learning Model Deployment

6 Deep Learning, Reinforcement Learning and Natural Language Processing

- Fundamentals of Deep Learning
- Convolutional Neural Networks (CNNs)
- Recurrent Neural Networks (RNNs)
- Natural Language Processing
- Reinforcement Learning
- TensorFlow and Kera

7 Generative AI

- Understanding of Gen AI
- Applications of Gen AI
- Development of Gen AI model
- Integration of Gen AI in Mobile App.
- Deployment

8 Deep Learning Applications

- Computer Vision
- Natural Language Processing
- Speech Recognition
- Model Deployment

9 Ethics and Responsibility in AI and Machine Learning

- Ethics in AI and ML
- Accountability and Responsibility
- Privacy and Data Protection
- Social Impact of AI
- Ethical Guidelines

Ex. No.	Name of Experiment	Hours
1.	Load a Dataset and perform basic preprocessing	
2.	Splitting of Dataset into Training and Testing Set	
3.	Explore Python Libraries Pandas, NumPy, Matplotlib etc.	
4.	Build Machine Learning Model for Linear Regression Analysis for predict.	
5.	Implement K – Means clustering to segment customer based on purchasing behaviour.	
6.	Build a Machine Learning Model – Decision Tree	
7.	Build a Machine Learning Model – Random Forest	
8.	Build a Machine Learning Model for Anomaly Detection	
9.	Build SVM model and evaluate performance (Precision, Recall, F-Score and Confusion Matrix)	
10.	Build a Neural Network using Keras or TensorFlow to classify the handwriting digits.	
11.	Implement a Convolutional Neural Network to classify images using given dataset.	
12.	Build a Recurrent Neural Network (RNN) for Sentiment Analysis.	
13.	Implement a Chatbot using RNN.	
14.	Compare two different Gen AI models	
15.	Integrate a Trained Machine Learning Model in Mobile APP for Prediction.	
16.	Case Studies	
17.	Mini Project	

INSTRUCTIONAL STRATEGY

The teacher should lay stress on the fundamentals of artificial intelligence and Machine Learning. The students must know about scope and future aspects of artificial intelligence and Machine Learning.

5.6.2	IOT (Practicum)	L T P
		1 0 3

1. COURSE OBJECTIVE

This course is designed to develop skills on Internet of things (IOT) using latest software & Hardware. The course helps students to build IOT applications and devices using controller, sensors, actuators, and other electronic components. It also helps candidates to develop competency on latest technologies using IOT in various sectors such as home automation, smart city, agriculture, automotive, manufacturing etc. This course also provides opportunities for starting their own start up by developing novel IoT applications.

2. COURSE OUTCOMES

- Comply with Industry health and safety guidelines.
- Identify the market needs & customer demand analysis.
- Ability to develop basic circuit design and measurement techniques and calibration according to common engineering standards symbols, unit, schematics.
- Ability to generate ideas for upgrading existing product or creation of new product as per customer requirement.
- Ability to convert Ideas into reality by developing prototype model with the help of microcontrollers and wired or wireless protocols.
- Ability to develop IOT applications based on specific needs.
- Ability to handle cloud operations for internet of things applications.
- Ability to implement ideas for entrepreneurship and better career opportunities.
- Create value by using problems solving approach and by applying innovation techniques.
- Ability to develop IoT applications related to home automation, agriculture, smart city, automotive, manufacturing etc.
- Able to create innovative products, processes, services, business models etc.
- Able Create and protect their intellectual property.
- Start Their Own Business | Start up | Entrepreneurship.

COURSE CONTENTS

1 Introduction to Industrial Safety Practices

- Fire Extinguishers & its Types
- Safely handling Tools & Equipment
- Use of proper Tools & Equipment & its maintenance
- OSH & practices to be observed as a precaution

2 Fundamentals of Internet of Things

- Introduction of Internet of Things
- Basics of electricals & electronics components used in IoT
- History of IoT
- Applications, Benefits and Limitations of IoT
- Important components of IoT – Micro Controller, Sensors, actuators, communication protocol, cloud etc
- IoT Architecture – Physical layer, Network layer, Data processing layer, Application layer.

3 **IoT Microcontrollers and Single board computer**

- Introduction to microcontroller
- Different types of microcontrollers, Arduino, Raspberry pi
- Introduction to input, output and PWM, interface of camera to raspberry pi, interface of various sensors to raspberry pi, IOT protocol (HTTP, MQTT, HTTPS) for RPI, Study connection of raspberry pi to cloud
- Important features of microcontroller
- Specification of microcontroller
- Selection of microcontroller based on IoT application.
- Basic programming of microcontroller
- Advanced programming of micro controller
- Debugging of program, Testing of program

4 **IoT Sensors**

- Introduction of Sensors
- Various types of Sensors and their applications
- Specifications of sensors
- Working principle of important sensors
- Comparison of sensors and relative advantages and limitations
- Selection of sensor based on IOT application.
- Interfacing of sensors with microcontroller to develop IOT application.
- Testing of sensors for IOT application

5 **Use of Actuators for IoT applications**

- Introduction to actuators
- Various types of actuators
- Working principle of actuator
- Applications of actuators
- Comparison of various actuators and relative advantages and limitations
- Selection of actuator based on IOT application

6 **IoT Network Connectivity**

- Introduction to IoT network technologies
- Various options for IoT connectivity
- Comparison of various options for IoT connectivity
- Selection of IoT connectivity based on application parameter like Range, Data size, Rate of data transfer, Type of data, Number of devices to be

connected etc.

7 **Cloud and Application of IoT**

- Various options available to store IOT Data
- Comparison of storage options
- Storage on premises and Cloud
- IOT Database
- Selection of database
- Interfacing Database with IOT application
- Requirements for IoT applications
- Selection of sensors and actuators as per IoT application
- IoT dashboard building
- Authentication
- IoT application building as per real world application related to Smart City, Healthcare, Automotive, Manufacturing.
- IoT based mobile application development
- Use of API in IoT application Building
- Basics of Machine Learning and AI
- Use of Machine Learning and Artificial Intelligence in IoT
- Industrial Use cases

Ex. No.	Name of Experiment	Hours
1.	Comply with Industry health and safety guidelines.	
2.	Identify the market needs & customer demand analysis.	
3.	Ability to develop basic circuit design and measurement techniques and calibration according to common engineering standards symbols, unit, schematics.	
4.	Ability to generate ideas for upgrading existing product or creation of new product as per customer requirement.	
5.	Ability to convert Ideas into reality by developing prototype model with the help of microcontrollers and wired or wireless protocols.	
6.	Ability to develop IOT applications based on specific needs.	
7.	Ability to handle cloud operations for internet of things applications.	
8.	Ability to implement ideas for entrepreneurship and better career opportunities.	
9.	Create value by using problems solving approach and by applying innovation techniques.	
10.	Ability to develop IoT applications related to home automation, agriculture, smart city, automotive, manufacturing etc.	
11.	Able to create innovative products, processes, services, business models etc.	
12.	Able Create and protect their intellectual property.	
13.	Start Their Own Business Start up Entrepreneurship	

INSTRUCTIONAL STRATEGY

The IoT can be a useful educational tool for students who use technology to solve unsolvable problems to increase their training skills. Students' academic behavior can also be tracked and recorded via wearable technology, which improves their interactive learning environment. IoT for education can help increase student engagement, create student-centered curriculums, and foster immersive language learning. Other than the classroom and laboratory learning, following are the suggested student-related co-curricular activities: Seminars, Library/Internet survey, MOOCs, Open source simulation software modules etc on relevant topics.

5.6.3	INDUSTRIAL AUTOMATION & MES	L T P
		1 0 3

COURSE OVERVIEW

This course is designed to provide a comprehensive understanding and hands on experience on Industrial Automation and Manufacturing Execution Systems (MES) to excel in the automation sector across various manufacturing domains. This includes Programmable Logic Controllers (PLC), Supervisory Control and Data Acquisition (SCADA), Human Machine Interfaces (HMI), Variable Frequency Drives (VFD), Manufacturing Execution System (MES), and the integration of these components to create cohesive and efficient systems. Participants will gain hands-on experience with the latest software and hardware tools, enabling them to adopt modern automation techniques in line with industry standards and build competency in the automation sector.

COURSE OUTCOME

- Adhere to industry health and safety standards when working with automation tools.
- Grasp the fundamentals of automation processes and their practical applications.
- Develop skills to program and operate Programmable Logic Controllers (PLCs).
- Select appropriate input and output devices for specific applications.
- Work with various industrial communication protocols.
- Understand the role and features of Human-Machine Interfaces (HMIs) in automation.
- Create dynamic HMI screens and manage alarms and events in HMI systems.
- Design recipes, manage security, and provide authorization in HMI systems.
- Learn about Variable Frequency Drives (VFDs) and their industrial uses.
- Connect VFDs to motors and analyse the effects of VFD parameters on motor.
- Understand and implement the features of SCADA systems in industrial settings.
- Design dynamic SCADA screens, manage alarms, handle recipes, implement security,
 - apply script programming and configure SCADA with PLCs.
- Integrate PLC, VFD, HMI and SCADA systems using communication protocols.
- Understand the role of MES and learn how MES improves production efficiency and
 - quality control.
- Implement MES to track and document the transformation of raw materials to
 - finished goods.
- Understand the integration of MES with other industrial systems like PLCs.
- Learn about the benefits of MES in reducing production downtime and enhancing
 - traceability.
- Develop skills to configure and customize MES solutions for specific industrial needs.

CONTENTS

Sr No	Course contents
1	Industrial Safety Practices • Fire Extinguishers & its Types • Safely handling Tools & Equipment • Use of proper Tools & Equipment & its maintenance • OSH & practices to be observed as a precaution
2	Fundamentals of Industrial Automation • Introduction to industrial automation • Need and application of automation • Benefits of automation • Types of Industrial automation • Important Components of Automation • Discrete, Continuous and Batch Manufacturing • Open-loop vs. Closed-loop systems • Introduction to PLC, HMI, VFD, SCADA, MES • Industrial sensors: types and applications • Actuators: motors, valves, pneumatics • Signal conditioning and A/D conversion • Process variables: temperature, pressure, flow, level • PID control and its applications • Control panel components and wiring standards • Industrial communication protocols
3	Programmable Logic Controller (PLC) • Introduction to Programmable Logic Controller (PLC) • Types of PLCs and selection criteria. • Application and advantages of PLC. • Important components of PLC • Numbering systems: binary, hexadecimal, BCD • PLC memory organization and addressing. • Explain sink and source concept. • Interfacing of PLC with field devices. • PLC communication protocols: Modbus, Profibus, ethernet/IP • Types of PLC programming • Ladder logic programming basics. • Conditional logic: AND, OR, NOT, NAND, NOR XOR, XNOR Gates • Timers and counters in PLC. • Explain advance instruction used in PLC. • Fault handling and troubleshooting in PLCs • Industrial case study of PLC.
4	Variable Frequency Drive (VFD) • Introduction to Variable Frequency Drive (VFD) • Basics of AC motors • Application of VFD • Components of a VFD: rectifier, DC bus, inverter • Types of VFDs: scalar control vs. vector control • Connections and control mechanism • VFD parameter configuration and settings

	• Study motor protection and overload prevention • Understand energy efficiency optimization using VFD • Troubleshooting and fault diagnosis in VFDs • Regenerative braking and energy recovery in VFD • Learn Modbus and ethernet communication for VFDs • Industry applications of VFD in HVAC, pumps, and conveyors • Case study: VFD implementation for smart energy saving • Interfacing of VFD with PLC & SCADA.
5	Human Machine Interface • Introduction to HMI • Role of HMI in industrial automation • Components of HMI • Compare HMI and SCADA • Communication protocols in HMI • User interface of HMI software. • Building basic HMI control animations. • Alarms and event logging • Security and user access management • Multi-screen navigation in HMI systems • Study trending and historical data logging • Communication between HMI and PLC • SCADA-HMI integration • Troubleshooting common issues in HMI. • Industrial case study: HMI in production line
6	Supervisory Control and Data Acquisition (SCADA) • Introduction to Supervisory Control and Data Acquisition (SCADA). • Application and advantages of SCADA • Important components of SCADA • Block diagram of SCADA • SCADA communication protocols. • Types of tags and its usage. • Explore the features of SCADA. • User interface of SCADA software • Building basic SCADA screens with animation. • Dynamic properties like sizing, location, blinking, visibility, percentage filling, object size, orientation, etc. • Alarm management and event logging in SCADA • Historical data logging and trending in SCADA. • Recipe management. • Script programming. • Security options and administrative levels in SCADA. • Explore data transfer feature in SCADA software. • SCADA and PLC interfacing for real-time control • Troubleshooting and fault detection. • Role of SCADA in industry 4.0 and IIoT. • SCADA applications in water treatment, energy, and manufacturing.
7	Flexible Manufacturing System (FMS)

	• Introduction to FMS and its importance in modern manufacturing • Important Components of FMS, Advantages and Disadvantages of FMS • Applications of Pneumatics in Manufacturing • Use of Machine Vision, important components, sorting application • Pick and Place concept and its important components
8	Overview of Manufacturing Execution Systems (MES) • Introduction to manufacturing execution systems (MES) • ISA 88 AND ISA 95 • MES architecture and MES core functionalities. • Key functions of MES: production scheduling, quality control, tracking. • MES data flow and communication protocols • Real-time work order management in MES • Resource allocation via MES • MES reporting and dashboards for production insights • Barcode integration for MES automation • Exploring MES and industry 4.0: digital twin and smart manufacturing • Case study: MES implementation in a smart factory.

PRACTICALS

- Explain different safety tools & Kits, Hazard identification & avoidance, proper waste management.
- Demonstrate various components of the automation simulator panel.
- Demonstrate signal measurement using Multimeter
- Identifying and testing of different type of sensors
- Demonstrate wiring and testing of various output devices.
- Show on-off control using relays.
- Test Emergency stop and safety interlock
- Decode alarm and status indications.
- Configuring and opening PLC programming software.
- Use of basic commands and instructions.
- Demonstrate XIC, XIO, coil and addressing concept.
- Interfacing digital I/O with PLC.
- Configuring analog, I/O with PLC.
- Writing basic ladder logic programs
- Implementing start-stop logic using push buttons
- Design logic gates concept using ladder diagram.
- Design and practice various real time scenarios.
- Configuring and programming timers and counters.
- Create various programs based on timer's application.
- Create various programs based on timer, counter and comparators.
- Design a PLC program to execute the elevator system in a 3-floor apartment.
- Troubleshooting faulty I/O modules in a PLC system.
- Programming safety interlocks for emergency shutdown.
- Demonstration of buttons/keys present on VFD.
- Configuring basic VFD parameters for motor speed control.

- Implementing start/stop and forward/reverse operation
- Adjusting acceleration and deceleration ramp times.
- Interfacing VFD with PLC for automated speed control.
- Implementing emergency stop and safety interlocks.
- Analysing VFD faults and troubleshooting issues.
- Opening the HMI programming software.
- Designing HMI screens with buttons and indicators
- Configuring alarms and event logging in HMI
- Setting up data entry fields in HMI for operator input
- Creating HMI screens for tank level monitoring
- Implementing multi-screen navigation and setting up trends in HMI.
- Integration of HMI with PLC.
- Debugging HMI-PLC communication issues
- Demonstrate the SCADA software interface.
- Design program for a switch and a lamp and check out results in runtime.
- Designing start/stop control for pumps and motors via SCADA
- Configuring alarm management system with alerts
- Logging and retrieving historical data for analysis
- Creating live graphs and trend displays for process monitoring
- Interfacing SCADA with PLC, HMI and VFD for motor control applications
- Implementing data export and report generation in SCADA
- Using SCADA for batch processing and recipe management.
- Designing a SCADA simulation for a smart dashboard energy monitoring system.
- Integrate pneumatic systems, sorting, and pick and place.
- Configuring MES software for the first time.
- Setting up work order tracking in MES.
- Implementing barcode/RFIDs-based inventory management
- Creating automated production reports using MES dashboards.
- Setting up automated work scheduling for assembly line operations.
- Demonstrate integration of MES with PLC for process automation.
- Setting up role-based user access for MES data security.

Identify and resolve common issues in the MES assembly line like communication failure, alarms, equipment malfunction and data irregularity.

5.7	INDIAN CONSTITUTION	L T P
		2 0 0

COURSE OBJECTIVES:

This course aims to help students understand the origin, development, and importance of the Indian Constitution. It introduces students to their fundamental rights and duties, while explaining the structure and functions of the legislature, executive, and judiciary in India. The course also promotes democratic values such as equality, justice, and the rule of law, and encourages students to develop a sense of responsible citizenship, civic awareness, and active participation in nation-building.

COURSE OUTCOMES (CO):

After successful completion of this course, the students should be able to

- CO1:** Understand the historical background, philosophy, and process involved in the making of the Indian Constitution.
- CO2:** Analyze the structure and functioning of the Union Government, including the roles, powers, and relationships of the President, Prime Minister, Council of Ministers, Lok Sabha, and Rajya Sabha.
- CO3:** Explain the organization and working of the State Government.
- CO4:** Evaluate the system of Local Administration in India by understanding the structure and functions of District Administration, Municipal Corporations, and Zila Panchayats.
- CO5:** Understand the role, powers, and significance of the Election Commission of India in ensuring free and fair elections in a democratic system.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	2	-	-	2	-	2	*	*
CO2	3	3	2	-	2	1	2	*	*
CO3	3	2	1	-	2	1	2	*	*
CO4	3	3	2	-	3	2	2	*	*
CO5	3	2	-	-	3	1	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENT

Unit 1 – The Constitution - Introduction

(6 Period)

The History of the Making of the Indian Constitution, Preamble and the Basic Structure, and its interpretation, Fundamental Rights and Duties and their interpretation. State Policy Principles

Unit 2 – Union Government

(6 Period)

Structure of the Indian Union, President – Role and Power, Prime Minister and Council of Ministers Lok Sabha and Rajya Sabha

Unit 3 – State Government

(8 Period)

Governor – Role and Power, Chief Minister and Council of Ministers, State Secretariat

Unit 4 – Local Administration

(4 Period)

District Administration Municipal Corporation, Zila Panchayat

Unit 5 – Election Commission

(4 Period)

Role and Functioning Chief Election Commissioner State Election Commission

RECOMENDED BOOKS:

S. No.	Title of Book	Author	Publication
1.	Ethics and Politics of the Indian Constitution	Rajeev Bhargava	Oxford University Press, New Delhi, 2008
2.	The Constitution of India	B.L. Fadia	Sahitya Bhawan; New edition (2017)
3.	Introduction to the Constitution of India	DD Basu	Lexis Nexis; Twenty-Third 2018 edition

Suggested Software/Learning Websites:

- a. <https://www.constitution.org/cons/india/const.html>
- b. <http://www.legislative.gov.in/constitution-of-india>
- c. <https://www.sci.gov.in/constitution>
- d. <https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/>

SUGGESTED DISTRIBUTION OF MARKS

SR No	Topic Time Allotted (periods)	Marks Allotted %
1	6	21
2	6	21
3	8	28
4	4	15
5	4	15
TOTAL	28	100

6.1	ENTREPRENEURSHIP AND START-UP	L T P
		2 0 0

COURSE OBJECTIVES:

Explore the Objectives of Entrepreneurship, including innovation, wealth creation, and societal impact, and learn how Entrepreneurs foster economic growth. Entrepreneurship drives the economy and is the very fundamental to all innovation and development.

COURSE OUTCOMES (CO):

After successful completion of this course, the students should be able to

CO1: Understand the basic of Entrepreneurship and Business Structures

CO2: Planning and implementation of Business ideas

CO3: Understanding Strategic Market Analysis

CO4: Manage Organizational roles

CO5: Understanding various Financial schemes

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	1	1	-	-	-	2	*	*
CO2	2	3	3	2	1	3	2	*	*
CO3	2	2	2	2	1	-	2	*	*
CO4	2	1	2	-	2	3	2	*	*
CO5	3	2	2	2	2	1	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENT:**Unit 1 : Introduction to Entrepreneurship and Start – Ups****(02 Periods)**

- Definitions, Classification of Entrepreneur
- Traits of an Entrepreneur, Intrapreneurship, Motivation
- Types of Business Structures- On the Basis of size and On the basis of ownership
- Similarities/differences between entrepreneurs and managers

Unit 2 : Business Ideas and their implementation**(06 Periods)**

- Discovering ideas and visualizing the business
- Activity map
- Business Plan (Case Study)

Unit 3 :Ideas to Start-up**(06 Periods)**

- Marketing and Accounting- Definition and Importance.
- Market Analysis – STP (Segmentation, Targeting, Positioning)
- Competition evaluation and Strategy Development – Vision, Mission, Goal, Objectives.
- Risk analysis- SWOT Analysis.

Unit 4 : Management**(04 Periods)**

- Definition Concept and Functions of Management
- Company's Organization Structure- Concept and Classification
- Recruitment and Selection- Definition,
- Training and Development- Importance.

Unit 5 : Financing and Protection of Ideas**(10 Periods)**

- Financing methods available for Entrepreneurship/ Startups in India (Government Scheme, Banking, NBFCs, SHG and Micro Financing).
- Intellectual Property Rights- Overview of - Copyrights, Trademark, Geographical Indicators, Patenting and Licenses
- Communication of Ideas to potential investors – Investor Pitch.

Succession, Dissolution and Harvesting strategy: Ways of succession ,Types of Dissolution

RECOMMENDED RESOURCES:

S. No.	Title of Book	Author	Publication
1.	The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company	Steve Blank and Bob Dorf	K & S Ranch ISBN – 978-0984999392

2.	Entrepreneurship Development (A new Venture creation)	Vasant Desai	Himalya Publication
3.	Entrepreneurship Development	Khanka S.S.	S Chand & Company Limited New Delhi
4.	Entrepreneurship Development	Gupta and Srinivsan	S Chand & Company Limited New Delhi
5	Demand: Creating What People Love Before They Know They Want It	Adrian J. Slywotzky with Karl Weber	Headline Book Publishing ISBN – 978-0755388974
6	The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses	Eric Ries	Penguin UK ISBN – 978-0670921607
7	The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business	Clayton M. Chris- tensen	Harvard business ISBN: 978-142219602

SUGGESTED SOFTWARE/LEARNING WEBSITES:

- a. <https://www.fundable.com/learn/resources/guides/startup>
- b. <https://corporatefinanceinstitute.com/resources/knowledge/finance/corporate-structure/>
- c. <https://www.finder.com/small-business-finance-tips>
- d. <https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/>
- e. NPTEL Course on Entrepreneurship https://onlinecourses.nptel.ac.in/noc23_mg74/preview
- f. National Geographic Channel you tube Video on “GI Tag Crafts of Bharat”

INSTRUCTIONAL STRATEGY:

Introduce each unit with a structured exposition of fundamental concepts, definitions, and classifications, emphasizing the roles, traits, and functions of entrepreneurs and managers. Practical applications, including case studies, business plan development, market analysis, and risk assessment, shall be demonstrated to illustrate real-world entrepreneurial processes. Students shall engage in guided exercises, group activities, and simulations to apply theoretical knowledge in developing business ideas, strategies, and investor communication skills. Assessment shall be conducted through presentations, discussions, and project-based evaluations to monitor understanding, provide feedback, and cultivate entrepreneurial competence.

SUGGESTED DISTRIBUTION OF MARKS:

Topic No.	Time Allotted	Marks Allotted
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	(Periods)	(%)
1	2	17
2	6	14
3	6	20
4	4	17
5	10	32
Total	28	100

6.2.1	TOTAL QUALITY MANAGEMENT(Theory)	L T P
		3 0 0

COURSE OBJECTIVES:

Understanding total quality management principles and philosophies. Learning quality management tool and techniques. Applying total quality management various production level in industries analyzing and improving

business processes. Courses focus on key quality management functions like man, machine, material method, measurement. Developing skills for continuous improvement and problem solving. Understanding customer needs and expectation implementing total quality strategies for organizational excellence.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1• Improve quality and productivity in organization and apply TQM principles in various industries.

CO2• Learn about material inspection and testing.

CO3• Process control using quality control targets, colour control patches, waste management.

CO4• Using of different calibration instruments and analysis of print attributes.

CO5• Awareness and implementation of ISO for print quality.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	1	*	*
CO2	3	2	2	-	-	-	2	*	*
CO3	3	3	2	-	-	-	2	*	*
CO4	3	3	3	-	-	-	2	*	*
CO5	3	-	-	-	-	-	3	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT -1 INTRODUCTION

(06 Periods)

1.1 Definition of quality terms, quality assurance quality control and TQM .

1.2 Quality control process statistical process control tool cause and effect diagram, check sheet, flow diagram, pareto analysis, histogram, run chart and control chart .

1.3 Basic concepts and benefits of Kaizen, TPM PDCA cycle, 5S, 5M .

UNIT -2 MATERIAL INSPECTING AND TESTING

(09 Periods)

2.1 Storage and handling of substrate and chemical etc.

2.2 Testing procedure of paper and board grain direction machine direction GSM stiffness tensile strength tearing resistance folding endurance bursting strength and COBB test.

2.3 Dampening solution testing methods testing of PH and conductivity, ink testing methods offset, flexography, gravure and screen printing .

UNIT -3 PROCESS CONTROL

(09 Periods)

- 3.1 Quality control targets - Registration mark, star target, ink coverage target and line resolution target.
- 3.2 Colour control patches, solid patches, halftone, slur/doubling gray balance, plate exposer control patches.
- 3.3 Wastage management and process control charts 8 steps to creating Xbar and R control chart.

UNIT -4 CALIBRATION OF INSTRUMENTS AND PROFILE

(09 Periods)

- 4.1 Densitometer- basic components and its working principles.
- 4.2 Spectrophotometer basic components and its working principles.
- 4.3 Analysis of print attributes, CTP calibration and linearization process.

UNIT -5 IMPLEMENTATION OF ISO FOR PRINT QUALITY

(09 Periods)

- 5.1 Introduction to ISO 9001.
- 5.2 Press calibration to ISO-12647-2 standard.
- 5.3 Implementation of ISO standards in printing organization customer satisfaction for print industry.

TEXT BOOKS / REFERENCE BOOKS:

1. Total Quality Management By Dr K.C. Arora publisher S.K. Kataria and sons.
2. TOTAL QUALITY MANAGEMENT 4th Edition by Poornima M Charantimath publisher pearson education.
3. THE SIX SIGMA HANDBOOK fifth edition by Thomos Pyzdek publisher tata McGraw Hill.
4. PRINCIPLES OF MANAGEMENT by N.G. Kale and M. Ahmad Vipul Prakashan Mumbai.

INSTRUCTIONAL STRATEGY

Total quality management strategies are carefully planned initiatives a company uses to achieve its objectives, gain a competitive advantage, and respond to changes in the quality environment. They involve making decisions about resource allocation, differentiation from competitors, and addressing both internal and external challenges and opportunities.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
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1	6	16
2	9	21
3	9	21
4	9	21
5	9	21
Total	42	100

6.2.2	PRINTING PRESS MANAGEMENT (Theory)	L T P
		3 0 0

COURSE OBJECTIVES

The objective of this course is to enable the students to encompass the strategies and tools used to oversee and optimize all aspects of printing operations within a business. Knowledge of print management software. Learn how to Increase the Productivity. Understand Print output management. Understand about cost management and security management.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1• Basic principles of management and business communication & coordination.
- CO2• Attain knowledge about print production planning.
- CO3• Workflow of printing press management and value system in the industry.
- CO4• Know about human resource management such as employee motivation, welfare, safety, health and environmental regulation.
- CO5• Learn about accounting principles and importance of budget.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
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					Environment				
CO1	3	-	-	-	-	-	-	*	*
CO2	3	-	-	-	-	-	-	*	*
CO3	3	-	-	-	-	-	2	*	*
CO4	3	-	-	-	-	-	3	*	*
CO5	3	-	-	-	-	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT -1 PRINCIPLES OF MANAGEMENT

(06 Periods)

- 1.1 Principles of management – Scientific management, Taylorism, Leadership management, Management grid, Organizational development, and Business process management.
- 1.2 Business communication and coordination – Business communication, Channels of communication, Methods of business communication, Management information system, Benefits of MIS and Application of MIS.

UNIT -2 PLANNING FOR PRINT PRODUCTION

(09 Periods)

- 2.1 Production system administration, Planning for various printed Products – Production control systems – Works initiation Procedures - Estimate, Purchase order, Raw material purchase, job card, changes in the specification of the Job, Proof, Material release authorization and final print order.
- 2.2 Planning consideration - Material purchasing and inventory control suitable material selection – Material management, Principles of purchasing, Production planning and control – Production scheduling, Production control, Quality control and Press layouts.

UNIT -3 MANAGEMENT WORKFLOW SYSTEM

(09 Periods)

- 3.1 Role of supervisor and manager in effective management workflow– managerial roles, Management influences and process integration, Ergonomics – Physical requirements of employees Working environment - Lighting, Glare and Contrast, Climate, Safety and Noise.
- 3.2 Value system in the industry - Developing Interpersonal management skills and Communication skills. Decision making and stages of decision making.

UNIT -4 HUMAN RESOURCE MANAGEMENT

(09 Periods)

- 4.1 Employee Motivation and Welfare – How to Motivate Employees, Employee Benefits, Work Study and Method Study – Time Management and Productivity Tools and Reduce or Minimizing the Wastages.
- 4.2 Safety, Health and Environmental Regulations in Graphic Arts Industry – Safety of Machinery in Printing Industry, Safety aspects in machines and House keeping

UNIT -5 ACCOUNTING AND BUDGETING

(09 Periods)

- 5.1** Accounting principles – Meaning of accounting principles, Classification or sub-fields of accounting – Financial accounting, Cost accounting, Management accounting and Tax accounting.
- 5.2** Definition of Budgeting and Importance of Budgeting – Annual Budget : Meaning of Budget, Purpose of Budget, Types of Budgets– Sales Budget, Production Budget, Marketing Budget, Sales and Turnover, Channel distribution and Sales Forecasting

TEXT BOOKS/REFERENCE BOOKS:

- The Complete book on Printing Technology by NIIR Board .
- Printmaking A complete guide to materials and processes by Bill Fick
- Effective Hiring by Paul Falcone
- Production Planning and Control by Jawad Akhtar

INSTRUCTIONAL STRATEGY

Begin with comprehensive software tutorials to familiarize students with Printing Press Management. Provide hands-on exercises and guided projects covering Management Principles, production planning and control, human resource management etc. Foster peer collaboration through group projects and critique sessions to encourage feedback and learning from peers. Offer opportunities for independent exploration and experimentation to encourage creativity and problem-solving skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	6	16
2	9	21
3	9	21
4	9	21
5	9	21
Total	42	100

6.2.3	BUSINESS MANAGEMENT	L T P
		3 0 0

COURSE OBJECTIVES:

Courses often cover the basics of business, including its structure, functions (like marketing, finance, operations), and how it operates in a given economic environment. Developing critical thinking and problem-solving. Students learn to analyse situations, identify problems, and propose solutions, often using both qualitative and quantitative techniques. Courses focus on key management functions like planning, organizing, leading, motivating, and controlling, as well as understanding leadership styles and organizational behaviour. Students learn how to communicate effectively, both verbally and in writing, in a business context. Understanding business ethics and social response.

COURSE OUTCOMES (CO)

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1• Basic introduction of management such as human resource and finance.
- CO2• Attain knowledge about organization behaviour.
- CO3• Learn about business laws and policies.
- CO4• Learn about different management strategies.
- CO5• Different attributes of entrepreneurship.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	1	*	*
CO2	3	2	2	-	-	-	-	*	*
CO3	3	-	-	-	-	-	2	*	*
CO4	3	-	-	-	-	-	2	*	*
CO5	3	-	-	-	-	-	3	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS:

UNIT -1 INTRODUCTION TO MANAGEMENT

(06 Periods)

1.1 Definition, general management function including planning, organizing, leading, and controlling.

1.2 Human Resource Management: Focuses on attracting, developing, and managing employees within an organization.

1.3 Finance Management: Covers financial decision-making, budgeting, and financial analysis.

UNIT -2 ORGANIZATIONAL BEHAVIOUR

(09 Periods)

2.1 Marketing Deals with the process of creating, communicating, and delivering value to customers.

2.2 Operations Management: Focuses on the efficiency and effectiveness of organizational processes and supply chains.

2.3 Managerial Economics: Applies economic principles to business decision-making.

UNIT -3 BUSINESS LAWS AND POLICIES

(09 Periods)

3.1 Provides an overview of legal frameworks relevant to business operations.

3.2 Business Environment: Examines the external factors that influence business operations, such as political, economic, social, and technological forces.

3.3 Communication: Focuses on effective communication strategies in business settings.

UNIT -4 STRATEGIC MANAGEMENT

(09 Periods)

4.1 Focuses on developing and implementing strategies to achieve organizational goals.

4.2 International Business: Explores the complexities of conducting business across borders.

4.3 Digital Marketing: Focuses on using digital channels to reach and engage customers.

UNIT -5 ENTREPRENEURSHIP

(09 Periods)

5.1 Supply Chain Management: Focuses on the coordination of activities involved in the flow of goods and services.

5.2 Business Ethics: Examines moral principles and values that guide business decision-making.

5.3 Leadership: Explores the qualities and skills needed to effectively lead and motivate others. Research Methods: Provides students with the skills to conduct business research and analyse data

TEXT BOOKS / REFERENCE BOOKS:

1. Factory organisation and Management by A Swatch K. Port Himalya Publishing House.
2. Modern Business Organisation and Management by Shekhar House S.A; Himalya Publishing.
3. Business Organization and Management by Shukla M.C. Publisher S. Chand and Co., New Delhi.
4. Industrial Management by Sprigal R. William; Publisher S. Chand and Co., New Delhi..

INSTRUCTIONAL STRATEGY

Business management strategies are carefully planned initiatives a company uses to achieve its objectives, gain a competitive advantage, and respond to changes in the business environment. They involve making decisions about resource allocation, differentiation from competitors, and addressing both internal and external challenges and opportunities.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	6	16
2	9	21
3	9	21
4	9	21
5	9	21
Total	42	100

6.3.1	INK TECHNOLOGY (Practicum)	L T P
		2 0 3

COURSE OBJECTIVES

To impart practical knowledge of various types of printing inks used for various printing processes. To provide hands-on knowledge of ink manufacturing process and experience of ink testing. To impart practical knowledge of various ink drying mechanisms/curing and chemicals used in printing.

COURSE OUTCOMES (CO):

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1• Basic knowledge and concept of Printing Ink and its classification.
- CO2• Describe various methods of ink drying system.
- CO3• Classify different properties of Printing Inks.
- CO4• Point out the radiation curing methods of ink drying.
- CO5• Examine the different printing ink problems – causes and remedies.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	-	*	*
CO2	3	-	-	-	-	-	-	*	*
CO3	3	-	-	-	-	-	2	*	*
CO4	3	-	-	-	-	-	2	*	*
CO5	3	3	3	-	-	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS

UNIT -1 INTRODUCTION:

(05 Periods)

Classification of inks- water based inks, solvent based inks. Ingredients in ink: Pigments- types and their properties, organic and inorganic pigments, Vehicles- vehicles for liquid inks, vehicles for paste inks, UV curing vehicles., Driers, Reducer, Extenders and Wax compound.

Ex. No.	Name of Experiment	Hours
1	Different samples of Inks and their study.	3
2	Introduction to various chemicals used in printing.	3
3	Testing of Ink using draw down test method.	3

UNIT -2 DRYING SYSTEMS

(05 Periods)

Physical drying, absorption drying, chemical drying, oxidation polymerization drying, radiation drying and curing, Microwave drying, infrared drying.

Ex. No.	Name of Experiment	Periods
1	Examine the different ink drying methods.	7

UNIT -3 PROPERTIES OF INK

(06 Periods)

Optical Properties of inks, Physical properties of Inks. Rheology of printing inks, Ink transfer requirements and ink distribution. Viscosity - Newtonian flow, units of viscosity, viscosity & temperature, factors influencing viscosity, Ink requirements for printing processes, letterpress, offset, , gravure, flexography, screen and digital printing.

Ex. No	Name of Experiment	Periods
1	Introduction to various chemicals used in printing ink.	4
2	Ink Viscosity Test.	4
3	Printed samples of different printing processes and their study.	6

UNIT -4 CURING BY RADIATION

(06Periods)

Introduction, radiation curing inks, curing considerations, Chemistry of UV curing- photo initiation, propagation, termination. Cationic curing, electron beam curing.

Ex. No.	Name of Experiment	Periods
1	Ink tackiness Test	4
2	Light fastness test.	4

UNIT -5 INK PROBLEMS

(06 Periods)

Causes and remedies for Ink problems.

Ex. No.	Name of Experiment	Periods
1	Examine the ink problem in different samples of different printing processes.	04

TEXT BOOKS / REFERENCE BOOKS

1. Printing inks and papers, C.S. Misra, Anupam Prakashan, Allahabad.
2. Mudran Syahiyan Tatha Kagaj, C.S. Misra, Anupam Prakashan, Allahabad.
7. The complete technology book on Printing inks, NIIR Board.
8. Materials Science, Dr. M. Arumugam .
9. Science and technology of Printing Materials , by Prakash Setty

INSTRUCTIONAL STRATEGY

Student should focus on understanding the composition, properties, and application of inks, along with various printing processes. This includes hands-on activities like ink mixing, exploring different printing techniques, and analyzing the results to understand the relationship between ink properties and print quality.

6.3.2	WEB OFFSET TECHNOLOGY (Practicum)	L T P
		2 0 3

COURSE OBJECTIVES:

The objective of this course is to enable the students to learn the fundamental principles of web offset printing, including the printing process, ink systems, and web handling. Identify and describe the major components of a web offset press, including the web feeding, printing units, and delivery system. Understand the pre-press and post-press operations involved in web offset printing, including plate making, folding unit, cutting unit and counting and bundling system. Learn about colour management and quality control in web offset printing, including colour matching, ink density, and print quality.

COURSE OUTCOMES(CO):

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1• Overview of web offset printing.
- CO2• Understand the basic components of web offset press.
- CO3• Knowledge about pre-press and post press operations.
- CO4• Working knowledge about press operation and maintenance.
- CO5• Learn about color management and quality control.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
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CO1	3	-	-	-	-	-	-	*	*
CO2	3	-	-	-	-	-	-	*	*
CO3	3	-	-	-	-	-	-	*	*
CO4	3	2	2	-	-	-	2	*	*
CO5	3	-	-	-	-	-	3	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS:

UNIT -1 INTRODUCTION TO WEB OFFSET PRINTING

(03 Periods)

- 1.1 Overview of printing processes.
- 1.2 Principles of web offset (Heat set Cold set) printing.
- 1.3 History and development web offset printing.

Ex. No.	Name of Experiment	Periods
1	Learn different type of paper use in web offset printing and collection.	3
2	Study reel stand and splicing system.	3

UNIT -2 WEB OFFSET PRESS COMPONENTS

(08 Periods)

- 2.1 web feeding system, including the web feed, registration, and web guide rollers.
- 2.2 Printing units, including the plate cylinder, blanket cylinder, and impression cylinder and rollers.
- 2.3 Ink system, including the ink fountain, ink train, and ink distribution, different type of dampening system.
- 2.4 Study off Delivery system, folder, kite former PIV, RTF, nip, folder ratio.

Ex. No.	Name of Experiment	Periods
1	Introduction to tool and equipment required in web offset lab.	2
2	Plate and blanket clamping system in web offset machine.	3
3.	Roller setting in inking unit all rollers .	3

UNIT -3 PRE-PRESS AND POST-PRESS OPERATIONS

(04 Periods)

- 3.1 Pre-press operations, including digital proofing, plate making, punching and bending.
- 3.2 Post-press operations, including counting, bundling, and packaging.

Ex. No.	Name of Experiment	Periods
1	Pre makeready for web offset machine.	2

2	Preparation of fountain solution and setting of dampening system.	2
3	Setting ink duct and keys in web offset machine.	2
4	Makeready operations for web offset machine.	2

UNIT -4 PRESS OPERATIONS AND MAINTENANCE (08 Periods)

- 4.1 Press setup and operation, including make-ready, ink adjustment, and impression setting.
- 4.2 UV printing and coating, including the benefits and challenges of UV technology.
- 4.3 Registration control system web offset machine.
- 4.4 Press maintenance and troubleshooting, including routine maintenance, fault diagnosis, and repair.

Ex. No.	Name of Experiment	Periods
1	Single colour printing by web offset machine 4HI one side.	3
2	Two colour printing by web offset machine 4HI one side.	3
3	Both side single/two colour printing 4 HI both side.	3
4	Multi colour printing one side by 4HI machine.	3
5	Multi colour printing both side by 4HI web offset machine .	3

UNIT -5 COLOR MANAGEMENT AND QUALITY CONTROL (05 Periods)

1. Color theory and color models, including RGB, CMYK, and Pantone.
2. Color management systems, including ICC profiles and color calibration.
3. Quality control measures, including print inspection, color checking, and defect detection.

Ex. No.	Name of Experiment	Periods
1	Quality Evaluation of printed sheet cutting, folding, ink density registration.	3
2	Cleaning of blankets, inking and dampening units.	2

TEXT BOOKS/REFERENCE BOOKS:

- Hand Book on Printing Technology (NIIR Board).
- The complete book on Printing Technology.
- Offset Printing and troubleshooting Practical Guide, K. Goshwami, Anupam Prakashan Prayagraj.
- Technology of Offset Printing, C.S. Mishra, Anupam Prakashan Prayagaraj.
- Offset Mudran Shastra (Hindi), C.S. Mishra, Anupam Prakashan Prayagaraj.

INSTRUCTIONAL STRATEGY

Understand the principles and components of web offset printing. Develop skills in operating and

maintaining a web offset press. Provide an overview of web offset printing principles and components. Demonstrate the operation and maintenance of a web offset press, and provide hands-on practice for students.

6.3.3	SHEET FED OFFSET TECHNOLOGY (Practicum)	L T P
		2 0 3

COURSE OBJECTIVES:

Fundamental principles of sheet fed offset printing, including the printing process, ink systems, and paper handling. Identify and describe the major components of a sheet fed offset press, including the feeder, printing units, and delivery system. Understand the pre-press and post-press operations involved in sheet fed offset printing, including plate making, binding, and finishing. Learn about color management and quality control in sheet fed offset printing, including color matching, ink density, and print quality.

COURSE OUTCOMES(CO):

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

- CO1• Overview of sheet fed offset printing.
- CO2• Understand the basic components of sheet fed offset press.
- CO3• Knowledge about pre-press and post press operations.
- CO4• Working knowledge about press operations and maintenance.
- CO5• Learn about color management and quality control.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	-	*	*
CO2	3	-	-	-	-	-	-	*	*
CO3	3	-	-	-	-	-	-	*	*
CO4	3	2	2	-	-	-	2	*	*
CO5	3	-	-	-	-	-	3	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

CONTENTS:

UNIT -1 INTRODUCTION TO SHEET FED OFFSET PRINTING (03 Periods)

- 1.1 Overview of printing processes.
- 1.2 Principles of sheet fed offset printing.
- 1.3 History and development of sheet fed offset printing.

Ex. No.	Name of Experiment	Periods
1	Feeder Setting in Sheet Fed Offset Machine.	4
2	Delivery unit setting in Sheet Fed Offset Machine.	4

UNIT -2 SHEET FED OFFSET PRESS COMPONENTS (08 Periods)

- 2.1 Feeder system, including the paper feed, registration, and sheet transport.
- 2.2 Printing units, including the plate cylinder, blanket cylinder, and impression cylinder.
- 2.3 Ink system, including the ink fountain, ink train, and ink distribution.
- 2.4 Delivery system, including the sheet delivery, stacking, and binding.

Ex. No.	Name of Experiment	Periods
1	Setting of sheet registration devices.	2
2	Roller setting in dampening system.	4
3.	Roller setting in inking system.	4

UNIT-3 PRE-PRESS AND POST-PRESS OPERATIONS (04 Periods)

- 3.1 Pre-press operations, including digital proofing, plate making, punching and bending.
- 3.2 Post-press operations, including binding, finishing, and packaging.

Ex. No.	Name of Experiment	Periods
1	Pre makeready for sheet fed offset machine.	2
2	Preparation of fountain solution and setting of dampening system.	2
3	Preparation of inking system.	4
4	Makeready operations for sheet fed offset printing machine.	4

UNIT -4 PRESS OPERATIONS AND MAINTENANCE (08 Periods)

- 4.1 Press setup and operation, including make-ready, ink adjustment, and impression setting.
- 5.4 UV printing and coating, including the benefits and challenges of UV technology.
- 5.5 Hybrid printing and finishing, including the combination of offset and digital printing.
- 5.6 Press maintenance and troubleshooting, including routine maintenance, fault diagnosis, and repair.

Ex. No.	Name of Experiment	Periods
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1	Single colour printing in single colour sheet fed offset machine.	4
2	Two colour printing in single colour sheet fed offset machine.	4
3	Both side (perfecting) single colour printing.	4
4	Multi-colour printing one side.	4
5	Multi-colour printing both side.	4

UNIT -5 COLOR MANAGEMENT AND QUALITY CONTROL (05 Periods)

5.7 Color theory and color models, including RGB, CMYK, and Pantone.

5.8 Color management systems, including ICC profiles and color calibration.

5.9 Quality control measures, including print inspection, color checking, and defect detection.

Ex. No.	Name of Experiment	Periods
1	Quality Evaluation of printed sheet.	4
2	Cleaning of blankets, inking and dampening units.	2

TEXT BOOKS/REFERENCE BOOKS:

- Sheet Fed Offset Technology, A.K. Baral.
- Hand Book on Printing Technology (NIIR Board).
- The complete book on Printing Technology.
- Offset Printing and troubleshooting Practical Guide, K. Goshwami, Anupam Prakashan Prayagraj.
- Technology of Offset Printing, C.S. Mishra, Anupam Prakashan Prayagaraj.
- Offset Mudran Shastra (Hindi), C.S. Mishra, Anupam Prakashan Prayagaraj.

INSTRUCTIONAL STRATEGY

Understand the principles and components of sheet fed offset printing. Develop skills in operating and maintaining a sheet fed offset press. Provide an overview of sheet fed offset printing principles and components. Demonstrate the operation and maintenance of a sheet fed offset press, and provide hands-on practice for students.

EVALUATION METHODOLOGY

1. EVALUATION METHOD for THEORY

	Internal Assessment (40 marks)				External Assessment (60 marks)
	IA 1	IA 2	IA 3	IA 4	
Mode	Written Test	Written Test	Attendance and Assignments	Pre – Semester Examination	End Semester Examination

Portion	2 units	2 units	Regularly	All units	All units
Duration1hr	1hr	1hr	-	3hrs	3hrs
Exam Marks	20	20	20	60	60
Converted to	10	10	15	15	60
Tentative Schedule	5 th Week	10 th Week	Regularly	12 th -13 th Week	

IA1 and IA2: A written assessment test worth 20 marks should be conducted for two units. The marks earned (20 marks) will be converted to 10 marks. The best of the two assessments will be evaluated for an internal 10-mark assessment.

IA3: Assignments given after the completion of each unit, along with attendance throughout the semester, will be assessed for a total of 15 marks.

IA4: The pre-semester examination should follow the end-semester examination question pattern. The marks should be adjusted to 15 for internal assessment.

2. EVALUATION METHOD for PRACTICAL

	Internal Assessment (60 marks)				External Assessment (40 marks)
	IA 1	IA 2	IA 3	IA 4	
Mode	Practical Test	Practical Test	Attendance and Practical Documentation	Practical Test and Quiz – Viva Voce	Practical Examination
Portion	50% Practical	50% practical	All practical	All practical	All practical
Duration	3hrs	3 hrs	Regularly	3 hrs	3hrs
Exam Marks	20	20	20	20	40

Tentative Schedule	5th Week	10th Week	Regularly	12th -13 th Week	
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IA1 and IA2: Complete all exercises and experiments as outlined and retain them for the practical test. The test should be conducted in accordance with the evaluation scheme. The best of the two practical tests will be internally evaluated for a total of 20 marks.

IA3: Maintain a practical file for each exercise while ensuring attendance throughout the semester. Submit the required documents for the practical file, quiz, and practical test along with a valid certificate (Progress Card). This will be assessed for 20 marks.

IA4: The pre-semester practical examination, quiz, and viva-voce should follow the end-semester practical examination pattern, with marks adjusted to 20 for internal assessment.

SUGGESTED DISTRIBUTION OF MARKS FOR **INTERNAL** EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Circuit Diagram	5
C.	Procedure and Connections	10
D.	Observation Table and Calculation	10
E.	Result and its Discussion, Conclusion	10
F.	Practical Test	20
	Total	60

SUGGESTED DISTRIBUTION OF MARKS FOR **EXTERNAL** EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Circuit Diagram	5
C.	Procedure and Connections	5
D.	Observation Table and Calculation	5
E.	Result and its Discussion, Conclusion	10
F.	Viva-Voce	10
	Total	40

3. EVALUATION METHOD for **PRACTICUM (End Exam-Practical)**

	Internal Assessment (60 marks)				External Assessment (40 marks)
	IA 1	IA 2	IA 3	IA 4	
Mode	Practical Test	Practical Test	Attendance and Practical Documentation	Micro Project	Practical Examination
Portion	50% practical	50% practical	All practical	All practical	All practical
Duration	3hrs	3 hrs	Regularly	Regularly	3hrs
Exam Marks	20	20	20	20	40
Tentative Schedule	5th Week	10th Week	Regularly	12th -13 th Week	

- **IA1 and IA2:** Complete all exercises and experiments as instructed and retain them for the practical test. The test should be conducted according to the evaluation scheme. The best of the two practical tests will be internally assessed for a total of 20 marks.
- **IA3:** Maintain a practical file for each exercise, ensuring attendance throughout the semester. Submit the required documents for the practical file, quiz, practical test, and end-semester examination, along with a valid certificate (Progress Card). This will be evaluated by 20 marks.
- **IA4:** Submit a micro-project report along with a fabrication model or analysis report. The performance of each student in the group will be assessed by both the laboratory supervisor and an internal examiner. This evaluation will contribute 20 marks.

SUGGESTED DISTRIBUTION OF MARKS FOR **INTERNAL** EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Circuit Diagram	5
C.	Procedure and Connections	10
D.	Observation Table and Calculation	10
E.	Result and its Discussion, Conclusion	10
F.	Mini Project	20
Total		60

SUGGESTED DISTRIBUTION OF MARKS FOR **EXTERNAL** EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Circuit Diagram	5
C.	Procedure and Connections	5
D.	Observation Table and Calculation	5
E.	Result and its Discussion, Conclusion	10
F.	Viva-Voce	10
Total		40

4. EVALUATION METHOD for **PRACTICUM (End Exam-Theory)**

	Internal Assessment (40 marks)						External Assessment (60marks)
	IA 1		IA 2		IA 3	IA 4	
Mode	Written Test	Practical Test	Written Test	Practical Test	Attendance and Practical Documentation	Pre Semester Examination and Micro Project	End Semester Examination
Portion	2 units	Practical related to the units	2 units	Practical related to the units	All unit	All Practical	All unit
Duration	1hr	3hrs	1hr	3 hrs	3hrs	Regularly	3hrs
Exam Marks	10	20	10	20	60	60	60
	30		30				
Converted to	10		10		15	15	60
Tentative Schedule	5 th Week		10 th Week		Regularly	12 th -13 th Week	

IA1 and IA2: A written assessment test worth 10 marks should be conducted for two **UNITs**. Complete all exercises and experiments as outlined and retain them for the practical test worth 20 marks. The practical test should be conducted in accordance with the evaluation scheme. The total marks earned (30 marks) will be converted to 10 marks. The best of the two assessments will be internally evaluated for a total of 10 marks.

IA3: Attendance and the pre-semester examination should follow the end-semester examination question paper pattern. The marks should be adjusted to 15 for internal assessment.

IA4: Maintain a practical file for each exercise. Submit the required documents for the practical file, quiz/viva-voice, practical test, and end-semester examination, along with a valid certificate (Progress Card). This will be assessed for 40 marks. Additionally, submit a micro-project report along with a fabrication model or analysis report. The performance of each student in the group will be evaluated by both the laboratory supervisor and an internal examiner. The total of 60 marks will be converted to 15 marks.

SUGGESTED DISTRIBUTION OF MARKS FOR INTERNAL EVALUATION FOR IA4

Part	Description	Marks Allotted
A.	Objective	5
B.	Circuit Diagram	5
C.	Procedure and Connections	5
D.	Observation Table and Calculation	5
E.	Result and its Discussion, Conclusion	10
F.	Attendance & Mini Project	10
	Total	40

(ANNEXURE-I)

PROCEDURES / FORMATS FOR ORGANIZING INTERNSHIPS.

STUDENT INTERNSHIP PROGRAM APPLICATION

Complete and submit to the TPO/ Internship Program Coordinator.

1. Student Name:		Enroll. No.:	
2. Campus Address:		Phone:	
3. Home Address:		Phone:	
4. Student email address:			
5. Branch:	6. Internship Semester: _____		
7. Internship Preferences			
	Company/Industry	Core Area	Location
Preference-1			
Preference-2			
Preference-3			
Faculty mentor Signature: _____ Date _____.			
Student Signature: _____ Date _____.			
Signature confirms that the student agrees to the terms, conditions, and requirements of the Internship Program			

Signature with seal
HOD/Principa

(ANNEXURE-I)

REQUEST LETTER FROM INSTITUTE TO INTERNSHIP/INDUSTRIAL TRAINING PROVIDER

Ref. No.: _____

Date: _____

To,
The HR Manager/Training Coordinator
.....
.....

Subject: Request for Internship/Industrial Training for Diploma Students

Sir/Madam,

We are pleased to introduce....., a premier institution affiliated with Board of Technical Education, Uttar Pradesh, offering diploma programs in various diploma disciplines.

As a part of the curriculum, our students are required to undergo Internship/Industrial Training to gain practical exposure and enhance their technical competencies. Therefore, we kindly request your esteemed organization to provide Internship/Training opportunities to our students during the period from to

S. No.	Name	Enroll. No.	Semester/Year	Discipline

Yours sincerely,

(Head of Department/Principal)

(ANNEXURE-II)

PROFORMA FOR EVALUATION OF INTERNSHIP BY INDUSTRY

Student Name:Evaluation Date:

Industry Supervisor Name: Company/Organization:

..... Title of the Project:

.....

Please evaluate your intern by indicating the frequency with which you observed the following behaviors:

Parameters	Max. Marks	Marks Given
Attendance and Punctuality	20	
Discipline and Professional Behavior	20	
Technical Knowledge and Understanding of Processes	30	
Practical Skills and Quality of Work	20	
Ability to Apply Theoretical Knowledge	20	
Problem Solving and Analytical Ability	10	
Communication and Interpersonal Skills	20	
Teamwork and Collaboration	10	
Internship Report/Documentation	20	
Presentation and Viva-Voce	30	
Total Marks	200	

Additional comments, if any:

Signature with seal of Industry supervisor

HR Manager

INTERNSHIP REPORT

STUDENT'S DIARY/ DAILY LOG

The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students should record in the daily training diary the day to day account of the observations, impressions, information gathered and suggestions given, if any. It should contain the sketches & drawings related to the observations made by the students.

The daily training diary should be signed after every day by the supervisor/ in charge of the section where the student has been working. The diary should also be shown to the Faculty Mentor visiting the industry from time to time and got ratified on the day of his visit.

Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. It will be evaluated on the basis of the following criteria:

- Regularity in maintenance of the diary.
- Adequacy & quality of information recorded.
- Drawings, sketches and data recorded.
- Thought process and recording techniques used.
- Organization of the information.

INTERNSHIP REPORT

After completion of Internship, the student should prepare a comprehensive report to indicate what he has observed and learnt in the training period. The student may contact Industrial Supervisor/ Faculty Mentor/TPO for assigning special topics and problems and should prepare the final report on the assigned topics. Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The training report should be signed by the Internship Supervisor, TPO and Faculty Mentor. The Internship report will be evaluated on the basis of following criteria:

- i. Originality.
- ii. Adequacy and purposeful write-up.
- iii. Organization, format, drawings, sketches, style, language etc.
- iv. Variety and relevance of learning experience.
- v. Practical applications, relationships with basic theory and concepts taught in the course.

MONITORING & EVALUATION OF INTERNSHIP

The industrial training of the students will be evaluated in three stages:

1. Evaluation by Industry.
2. Evaluation by faculty supervisor of Industry.
3. Evaluation through seminar presentation/viva-voce at the Institute.

1. EVALUATION BY INDUSTRY

The industry will evaluate the students based on the Punctuality, eagerness to learn, Maintenance of Daily Diary and skill test in addition to any remarks.

2. MONITORING/ SURPRISE VISIT BY TPO/ STAFF/ FACULTY MENTOR

TPO/Staff/ Faculty Mentor of the institutes will make a surprise visit to the internship site, to check the student's presence physically, if the student is found absent without prior intimation to the T & P Cell, entire training will be cancelled. Students should inform the TPO, faculty mentor as well as the industry supervisor at least one day prior to availing leave by email. Students are eligible to avail 1-day leave in 4 weeks and 2 days leave in 6 weeks of the internship period apart from holidays and weekly offs.

3. EVALUATION THROUGH SEMINAR PRESENTATION/VIVA-VOCE AT THE INSTITUTE

The student will give a seminar based on his training report, before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria:

- Quality of content presented.
- Proper planning for presentation.
- Effectiveness of presentation.
- Depth of knowledge and skills.
- Attendance record, daily diary, departmental reports shall also be analyzed along with the Internship Report.

Seminar presentation will enable sharing knowledge & experience amongst students & teachers and build communication skills and confidence in students.