

**M. Tech.**  
**(PRINTING TECHNOLOGY)**  
**(Scheme of Examination)**

**w.e.f. Session 2022-2023**



**MAHARSHI DAYANAND UNIVERSITY,**  
**ROHTAK**  
**(HARYANA)**

**(Established by State Legislature Act 25 of 1975)**

**('A+' GRADE NAAC ACCREDITED UNIVERSITY)**

**SCHEME OF EXAMINATIONS**  
**M. TECH (PRINTING TECHNOLOGY)**  
**w.e.f. Session 2022-2023**

**1<sup>ST</sup> YEAR (1<sup>ST</sup> SEMESTER)**

Course No.	Course title	Teaching Schedule				Credit	Examination Schedule			Duration of exam	Total marks
		L	T	P	Total		Internal Marks	Theory Marks	Practical Marks		
<b>22MPT21C1</b>	Graphics in Printing and Packaging	3	1		4	4	50	100	-	3	150
<b>22MPT 21C2</b>	Print and Packaging Material and Testing	3	1		4	4	50	100	-	3	150
<b>22MPT21C3</b>	Newspaper and Multi Media Technologies	3	1		4	4	50	100	-	3	150
<b>22MPT21C4</b>	Print Entrepreneurship	3	1		4	4	50	100	-	3	150
<b>22MPT21C5</b>	Advanced Print Finishing Techniques	3	1		4	4	50	100	-	3	150
<b>22MPT 21C6</b>	Digital workflow Lab			2	2	1	50		50	3	100
<b>22MPT21C7</b>	SEMINAR	-	-	-	2	1	50		-	3	50
	<b>Total</b>	<b>15</b>	<b>5</b>	<b>2</b>	<b>24</b>	<b>22</b>	<b>TOTAL MARKS→</b>			<b>900</b>	

**SCHEME OF EXAMINATIONS**  
**M. TECH (PRINTING TECHNOLOGY)**  
**w.e.f. Session 2022-2023**

**1<sup>ST</sup> YEAR (2<sup>ND</sup> SEMESTER)**

Course No.	Course title	Teaching Schedule				Credit	Examination Schedule			Duration of exam Hrs.	Total marks
		L	T	P	TOTAL LHrs.		Internal Marks	Theory Marks	Practical Marks		
22MPT22C1	Modern Printing Systems	3	1		4	4	50	100	-	3	150
22MPT22C2	Digital Imaging Techniques	3	1		4	4	50	100	-	3	150
22MPT22C3	Advanced Quality Control and Instrumentation	3	1		4	4	50	100	-	3	150
22MPT22C4	Print Technology Management	3	1		4	4	50	100	-	3	150
22MPT22C5	Modern Security Printing	3	1		4	4	50	100	-	3	150
22MPT22C 6	Print Machine Maintenance Lab			2	2	1	50		50	3	100
	Foundation Elective	2			2	2	10	40	-	2	50
	<b>Total</b>	<b>17</b>	<b>5</b>	<b>2</b>	<b>24</b>	<b>23</b>	<b>TOTAL MARKS→</b>			<b>900</b>	

**FOUNDATION ELECTIVE:** A candidate has to select this paper from the pool of Foundation Electives provided by the University.

**SCHEME OF EXAMINATIONS**  
**M. TECH (PRINTING TECHNOLOGY)**  
**w.e.f. Session 2022-2023**  
**2<sup>ND</sup> YEAR (3<sup>RD</sup> SEMESTER)**

Course No.	Course title	Teaching Schedule				Credit	Examination Schedule			Duration of exam Hrs.	Total marks
		L	T	P	Total		Marks of classy	Theor Marks	Practic al Marks		
	Open Elective (Choose any one)	3	-	-	3	3	20	80	--	2	100
22MPT23D1 OR 22MPT23D2 OR 22MPT23D3	Elective-1 (Choose any one)	3	1		4	4	50	100		3	150
22MPT23C3	DISSERTATION (PHASE-I)	-	-	4	4	2	100			3	100
22MPT23C4	Print and Packaging Quality Control Lab.			2	2	1	50		50	3	100
22MPT23C5	SEMINAR				2	2	50			3	50
	<b>Total</b>	<b>6</b>	<b>1</b>	<b>6</b>	<b>13</b>	<b>12</b>	<b>TOTAL MARKS→</b>			<b>500</b>	

**NOTE: 1. Students will be allowed to use non-programmable scientific calculator. However, sharing of Calculator will not be permitted in the examination.**

**2. Students have to publish a research paper in a journal / conference on the basis of literature survey done in the semester.**

**OPEN ELECTIVE: A candidate has to select this paper from the pool of open electives provided by the University.**

**Elective-1 ( CHOOSE ANY ONE)**

22MPT23D1	Maintenance Management.
22MPT23D2	Modern Packaging Technology.
22MPT23D3	Advanced Printing Technology

**SCHEME OF EXAMINATIONS**  
**M. TECH (PRINTING TECHNOLOGY)**  
**w.e.f. Session 2022-2023**

**2<sup>ND</sup> YEAR (4<sup>TH</sup> SEMESTER)**

Course No.	Course title	Teaching Schedule				Credit	Internal marks	External marks	Total marks
		L	T	P	Total				
<b>22MPT24C1</b>	Dissertation and viva	-	-	20	20	20	250	500	750
	<b>Total</b>	-	-	<b>20</b>	<b>20</b>	<b>20</b>	<b>250</b>	<b>500</b>	<b>750</b>

**NOTE: 1. Students have to publish a research paper in a journal / conference of the research work done in the semester.**

## GRAPHICS IN PRINTING & PACKAGING

General Course Information	
Course Code: <b>22MPT21C1</b>	<b>Course Assessment Methods;</b> <b>Max. Marks: 150</b> <b>Internal sessional:50</b> <b>Theory Exam:100</b>
Course Credit: 4	
Contact Hours: 4	
Mode: Lectures and Tutorials	
Examination Duration: 3 Hours	

**Course Objective:** This course deals with broad overview of computer graphics which is helpful for Printing, Packaging, Publishing, & Silicon corporate arena. It will cater the pre-press sections of industrial sectors for in-depth assignments. Valuable inputs from industry would be incorporated from time to time.

**NOTE:** For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt 5 questions, question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.

### UNIT- I

Overview of Computer Graphics, Interactive graphics, Passive graphics. Advantages of interactive graphics . Introduction to 2-D and 3-D Graphics.

Display Devices: Refresh CRT, Random-Scan and Raster-Scan Monitor, Color CRT Monitors, DVST, Plasma-Panel Displays, LED and LCD monitors. Hard copy devices.

### UNIT- II

Document Processing Language, Programming for processing in Post Script Language, Detail study about vector graphics and Bit Map images, life size and image compression, Linking objects to URL's for internet web pages, Portable document format, print document format, PDF workflow systems, print job ticket format (PJTF), Raster image processing, linking, electronic dot generator. Publishing software: PageMaker, CorelDrawetc.

### **UNIT– III**

Graphic text formats: GIF – Graphic Image Format, TIFF – Tagged information file format, JPEG- Joint Photographer Experts Group, BMP – Bitmaps, EPS – Encapsulated Post-script Format, PICT – picture, RTF – Rich Text Format, DOC – Document format, WPG – Word Perfect Graphic, Txt – Text formats, Publishing software :MS Word.  
OPI servers file server & networks, digital file export.

### **UNIT– IV**

Interactive graphics: Concept of Positioning and Pointing. Interactive Graphic Devices (Key Boards, Touch Panels, Light Pens, Graphic Tablets, Joysticks, Mouse-Voice System) Interactive Graphical Techniques: Basic Positioning Methods, Constraints, Grids, Gravity field, Rubber-Band Methods, Sketching, Dragging, Inking and Painting.  
Computer Graphic Software: Introduction, GKS (Primitive, attributes and Viewport, Display subroutines)

#### **Course Outcomes:**

1. The students will be able to execute Interactive devices.
2. The students will become able to work with publishing software and file formats.
3. The students will able to implement their skills & knowledge in the organization.

**References: Text & Reference Books:**

1. Roy, A. Plastock, Gordon Kalley, "Computer Graphics" (Scham's Series) McGraw Hill.
2. Donald Hearn, M. Pauline Baker, "Computer Graphics", Prentice Hall of India.
3. Foley, VanDam, Fiener, Hughes, "Computer Graphics", Addison Wesley.
4. Harrington, Steven, "Computer Graphics A Programming Approach", McGraw Hill.
5. Dovid F. Rogers; "Procedural Elements for Computer Graphics", McGraw Hill.
6. Newman, W. Sproul, R.F., "Principles of Interactive Computer Graphics", McGraw Hill.
7. PDF : Printing & Workflow, Frank J. Romano, GATF Publication
8. Adobe Guide on Post Script Language.



## PRINT AND PACKAGING MATERIAL & TESTING

General Course Information	
Course Code: <b>22MPT 21C2</b>	<b>Course Assessment Methods;</b> <b>Max. Marks: 150</b> <b>(Internal sessional:50</b> <b>Theory Exam:100)</b>
Course Credit: 4	
Contact Hours: 4	
Mode: Lectures and Tutorials	
Examination Duration: 3 Hours	

### Course Objective

The objective of this course is to impart the knowledge of different conventional and non conventional printing and packaging materials used in the industry along with their identification and testing techniques with respect to quality control.

**NOTE:** For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt 5 questions, question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.

### UNIT -I

Study of materials for pre-press films used for image-setter, plates used for plate-setters, chemicals used for processing of plates, light sources used such as laser, UV etc. plating chemicals for gravure cylinders such as copper, chrome, nickel etc. plating tanks, plating calculations such as current density, plating time.

Non conventional and conventional Substrates used for printing and packaging – various stocks. Paper : glazed, coated and LWC.

## UNIT -II

Plastics : Polyolefin's like low density polyethylene, linear low density polyethylene, high density polyethylene, metal locene, cast polypropylene, Bi-axially oriented polypropylene, pearlised BOPP, properties of polyolefin's and application, manufacturing processes for polyolefin's. Other plastic substrates such as polyamide, polystyrene, acrylonitrile-butadiene styrene, polyethylene terephthalate. Other film as Aluminum foils, metalized films etc. factors to be considered for selecting substrate for a package.

Identification of the materials for printing and packaging by burning and solubility.

## UNIT -III

Testing of materials for printing and packaging tests on package such as tearing, bursting strength, puncture resistance, grammage, drop test, and mechanical strength tensile modulus of elasticity, ash content test, optical test, cob test, chemical tests etc.

Inks used for printing – solvent based, water based UV based, drying mechanism.

## UNIT -IV

Tests on inks – Dispersion test, colour comparison by drawdown and printing, strength comparison Ink-tack measurement, viscosity measurement by various viscosimeters such as Ford cup, Zahn cup etc. Adhesion tests viscosity theory and rheology. Trouble shooting for inks and substrates.

### Course Outcomes :

1. The students will be having the detailed knowledge of different conventional and non conventional printing and packaging materials used in the industry along with their identification.
2. The students will understand the testing techniques of printing and packaging materials.
3. They will be able to implement their knowledge for quality printing and packaging.

### Text & Reference Books:

1. Plastics in Packaging by A.S. Athyale Tata McGraw Hill Publication.
2. Plastics in Flexible Packaging by A.S. Athyale- Tata McGraw Hill Publications.
3. Printing inks by Ronald E Todd-Pira
4. Printing Ink Technology by E-A Apps- Leonard Hill Ltd.
5. Pulp and Paper by James P. Cesey- Inter science publication.

## NEWSPAPER AND MULTIMEDIA TECHNOLOGIES

<b>General Course Information</b>	
Course Code: <b>22MPT21C3</b>	<b>Course Assessment Methods;</b> <b>Max. Marks: 150</b> <b>Internal sessional:50</b> <b>Theory Exam:100</b>
Course Credit: 4	
Contact Hours: 4	
Mode: Lectures and Tutorials	
Examination Duration: 3 Hours	

### **COURSE OBJECTIVE**

The purpose of this paper is to examine the constraints in designing newspaper and analyze different parts of a newspaper in relation to design. In particular, this subject gives the opportunity to the students to build an understanding of multimedia concepts & techniques and Newspaper designing.

**NOTE:** For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt 5 questions, question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.

## UNIT -I

**Newspaper Management and Organization:-** Meaning of Management, Importance Of Management in a Newspaper, Principles of Management, Managerial functions in a Newspaper Organization- Planning, Organization, Organizational Structure, Coordination, Motivation, Control, Decision-Making, Departmentalization.

**Newspaper in India (An Overview):-** Number of newspapers, Circulation, Press Council of India, Press Information Bureau, News Agencies- Press Trust of India, United News Of India, Non- Aligned News Agencies Pool, Other News Agencies.

## UNIT -II

**Editing for a Better Designed Newspaper:** - Designing by Editing, Some tips for better editing and design, Think Graphics, Changing Attitude, Content Relevancy.

**Newspaper Make-up:-** Newspaper Designing, Design Approach, Newspaper form, Newspaper format, Design Elements, Page Make-up.

## UNIT -III

**Exploring the World of Multimedia:** - What is Multimedia, Types of Multimedia Productions, The Development of Multimedia, Multimedia and Society.

**The Internet and Multimedia:** - How the Internet developed, connecting to the Internet, Navigating the Web, Searching the Web, Communicating via the Internet.

## UNIT -IV

**Text And Graphics:-** Role of Text and Graphics in Multimedia, Working with text, Formatting text, Using Font selection guidelines, Computer Graphics Technology, Editing Graphics

*Audio and Video:* - Role of Audio and Video in Multimedia, Software and Hardware for Audio and Video.

### **Course Outcomes:**

1. The students will be able to understand the latest technology in this field.

2. The students will become a skilled and creative user of current multimedia and newspaper technology.
3. Students will be able to implement their skills and knowledge in newspaper & multimedia organizations.

**Text & Reference Books:**

1. News Paper Management in India by Gulab Kothari, Rajasthan Patrika, New Delhi.
2. Art and Print Production by N.N. Sarkar, Oxford University Press, New Delhi.
3. Contemporary News paper Design by Mario R. Garcia, Prentice Hall, Englewood Cliffs, New Jersey.
4. Introduction to Multimedia by Ana Weston Solomon, Tata Mcgraw-Hill Publishing Company Ltd., New Delhi.

## PRINT ENTREPRENEURSHIP

<b>General Course Information</b>	
Course Code: <b>22MPT21C4</b>	<b>Course Assessment Methods</b> <b>Max. Marks: 150</b> <b>Internal sessional:50</b> <b>Theory Exam:100</b>
Course Credit: 4	
Contact Hours: 4	
Mode: Lectures and Tutorials	
Examination Duration: 3 Hours	

**Course Objective:-**The purpose of this paper is to prepare a ground where the students view Entrepreneurship as a desirable and feasible career option. In particular the paper seeks to build the necessary competencies and motivation for a career in Entrepreneurship.

**NOTE:** For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt 5 questions, question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.

### UNIT-I

#### **Entrepreneurship**

Concept/ Meaning

Need

Competencies/ qualities of an entrepreneur

#### **Entrepreneurial Support System**

District Industry Centers (DICs)

Commercial Banks

State Financial Corporations

Small Industries Service Institutes (SISIs), Small Industries Development Bank of India (SIDBI), National Bank for Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions / organizations at State level.

## **UNIT-II**

### **Market Survey and Opportunity Identification (Business Planning)**

How to start a small scale industry

Procedures for registration of small scale industry

List of items reserved for exclusive manufacture in small scale industry

Assessment of demand and supply in potential areas of growth

Understanding business opportunity

Considerations in product selection

Data collection for setting up small ventures

### **Project Report Preparation**

Preliminary Project Report

Techno-Economic feasibility report

Project Viability

### **Legal Aspects of Small Business**

Elementary knowledge of Income Tax, Sales Tax, Patent Rules, Excise Rules.

Factory Act and Payment of Wages Act.

## **UNIT-III**

### **Women Entrepreneurs**

Main Problems of Low Women Entrepreneurship in India

Important Schemes for women Entrepreneurs

## **UNIT-IV**

### **Environmental considerations**

Concept of ecology and environment

Factors contributing to Air, Water, Noise pollution

Air, water and noise pollution standards and control

Personal Protection Equipment (PPEs) for safety at work places

Status of Printing Industry in India

Current scenario of printing industry in India

Case study on Indian printing industry

**Course Outcomes:**

1. Students will be able to learn fundamentals of Entrepreneurship.
2. Students will be aware of legal aspects of Industries.
3. Preparing Print Technocrat for fulltime involvement in his own/her occupation as an entrepreneur.

**Text & Reference Books:**

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publication, Panchukula (Haryana).
2. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and sons, New Delhi
3. Environmental Engineering and Management by Suresh K Dhamija, SK Kataria and sons, New Delhi
4. Environmental and Pollution Awareness by Sharma BR, Satya Prakashan, New Delhi
5. Thakur Kailash, Environmental Protection Law and policy in India: Deep and Deep Publications, New Delhi
6. Handbook of Small Scale Industry by PM Bhandari
7. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi
8. Total Quality Management by Dr DD Sharma, Sultan Chand and Sons, New Delhi
9. Principles of Management by Philip Kotler TEE Publication.



## ADVANCED PRINT FINISHING TECHNIQUES

General Course Information	
Course Code: 22MPT21C5	<b>Course Assessment Methods;</b> <b>Max. Marks: 150</b> <b>Internal sessional:50</b> <b>Theory Exam:100</b>
Course Credit: 4	
Contact Hours: 4	
Mode: Lectures and Tutorials	
Examination Duration: 3 Hours	

**Course Objective:** The objective of this course is to impart knowledge on major finishing techniques and materials.

**NOTE:** For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt 5 questions, question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.

### UNIT- I

Finishing Techniques and principles. Adhesives used for finishing and packaging.

### UNIT- II

Concept of CIP3 , CIP4.

Lamination techniques and UV curing.

### **UNIT - III**

**Extrusion process and co-extrusion techniques.** Plastic used in packaging: polyethylene (hdpe, ldpe, lldpe, others), polypropylene, polystyrene, polyvinyl chloride, polyethylene terephthalate, polyvinyl acetate, polyvinyl alcohol, ethylene vinyl alcohol etc.

### **UNIT - IV**

**Concept of Shrink and stretch packaging.** Various forms of pouches – tetra pack, octagonal bag-in-box for solid and liquids, packaging & packages for food products, microwave packaging, PET bottles for food packaging.

#### **Course Outcomes :**

1. The students will be able to understand the elementary as well as the latest finishing techniques in printing & packaging field.
2. The students will be able to understand different forms of packaging.
3. The students will be able to use packaging materials and techniques as per the need in Industry.

#### **Text & Reference Books:**

1. Binding, finishing and mailing: The final word T.J. Tedescos, GATF 99 publication.
2. Binding and finishing: Ralph Lyman, GATF 99 Pub.
3. Finishing for customer : John Birkanshaw (PIRA)
4. Binder Technology – Dale Diu (PIRA)
5. Modified Atmosphere food packaging by Aaron Brudy (PIRA)
6. Microwave Packaging by Stanley Sachavow/Robert Schiffmann (PIRA)
7. Developments in Barrier Technology by David Shires (PIRA)
8. Plastics in Packaging by A.J. Athayle
9. Handbook of Food packaging by F.A. Raine, 11P, 2<sup>nd</sup> edition.

## DIGITAL WORKFLOW LAB

General Course Information	
Course Code: <b>22MPT 21C6</b>	<b>Course Assessment Methods; Max. Marks: 100 (Internal: 50; External: 50)</b>
Course Credit: 1	The end semester practical examinations will be conducted jointly by external and internal examiners.
Contact Hours: 2	
Mode: Practical	
Examination Duration: 3 Hours	

### List of Experiments -

1. Study of Computer to Technologies: Computer to Film, Computer to Plate, Computer to Press and Computer to Print.
2. Study of Digital Workflow Software's. For Example- Prinect, Creo, Esko, Torflex, Prinergy, Total flow solutions, etc.
3. Study of 3-D Printing Workflows.
4. Study of Color Management Software
5. Machines, Equipments and Components used in Digital Workflows.
6. Print Production Via Digital Workflows-:
  - a. Total Flow Capture- Composition, Variable Data Printing
  - b. Total Flow Manage- Mail Preparation, Make Ready, Print MIS/ Transforms, Prepress, Output Management.
  - c. Total Flow Produce- Color Manage, Print Manage Workflow

### Course Outcomes :

1. Students will learn the know-how of CTP.
2. The students will be able to understand digital workflow system.
3. The student will understand about the CMS.
4. The students will be able to use their knowledge in the Industry.

## MODERN PRINTING SYSTEMS

General Course Information	
Course Code: <b>22MPT22C1</b>	<b>Course Assessment Methods;</b> <b>Max. Marks: 150</b> <b>Internal sessional:50</b> <b>Theory Exam:100</b>
Course Credit: 4	
Contact Hours: 4	
Mode: Lectures and Tutorials	
Examination Duration: 3 Hours	

**Course Objective:** This course deals with broad overview of printing systems which is helpful for Printing & Packaging fields. It will cater the different sections of industrial sectors for in-depth assignments. Valuable inputs from industry would be incorporated from time to time.

**NOTE:** For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt 5 questions, question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.

### UNIT – I

Computer aided offset presses, PEC, PEM, PECOM, CIP3, CIP4 Technology.

Drive systems for offset presses, pneumatics, hydraulics, common shafts and shaft-less. Hi-Fi color printing. Automatic plate mounting systems for offset presses. Driography process, Security Printing, Non Impact Process. Trouble shooting in offset presses. Other printing processes like Pad printing, screen printing, heat transfer, tampon printing.

## UNIT - II

Digital and customized printing DI Presses Understanding press functions and how they are controlled. Image carriers for gravure- functions, variables in plating, hardness, calculation.

Integrated Gravure Pre-press-direct to gravure, electronic engraving, fast cross feed, twin mode, sequential engraving, shrink compensation, automation in engraving like Hello Robot, Laser beam and electronic Beam approach, Dot generation for gravure, cylinder correction techniques like burnishing, re-etching, cell size by electronic engraving, environmental and safety consideration, cylinder proofing machines.

## UNIT - III

Doctor Blades - Purpose, focus on doctor blade, pressurization system, oscillation mechanism, chrome fracturing density, wear mechanism, manufacturing, Lamella, mounting and set up storage, problems quality control and inspection of doctor blades.

Continuous flow inking system, impression roller pressure, sleeve systems, electrostatic assisted ink transfer, structure of impression roller for ESA, conductivity, cooling mechanism.

Drives the Gravure and Flexo Electronic line shaft mechanism pneumatics and hydraulics used in gravure and Flexo.

## UNIT - IV

**Mounting system for flexo-** Pin register mounting, microdot technology, video mounting, sleeve mounting, New flexo approaches – Cyrel, Dig sleeve, Anilox Roller, Structure, Cell structure and cell making.

**Press environment logistics-** Handling systems, waste disposal, exhaust at purification, cleaning systems, pressure climate, requirements, machine maintenance and Care.

**Digital Printing** – Integration for Packaging application – such as label. Hybrid systems such as Gravure – Flexo , Offset, Gravure etc.

### Course Outcomes:

1. The students will be able to work with Modern Printing Systems and various perspectives associated with it.
2. The students will understand different aspects of Digital and customized printing for their

Industrial applications.

**Text & Reference Books:**

1. On demand printing by Havoed M Fenton Frank J. Romao, 1<sup>st</sup> edition, 1998
2. Developments in Web Offset by Bob Durrant.
3. Comparative guide to direct – to – press technology. 2<sup>nd</sup> edition-1999, By Molly J. Joss.
4. Gravure process and technology – Gravure Education foundation- Gravure Association of America.
5. Flexography 2<sup>nd</sup> Edition – Pira Visual Aid.
6. Modern Gravure Technology by Harry B. Smith – Pira International.

## DIGITAL IMAGING TECHNIQUES

General Course Information	
Course Code: <b>22MPT22C2</b>	<b>Course Assessment Methods; Max. Marks: 150 (Internal sessional:50, Theory Exam:100)</b>
Course Credit: 4	
Contact Hours: 4	For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.
Mode: Lectures and Tutorials	
Examination Duration: 3 Hours	

### Course Objective:

The aim of this subject is to explore knowledge about Digital Images, Colour and Colour Management in digital printing.

**NOTE:** For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt 5 questions, question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.

### UNIT-I

Images and Types of Images (colour originals), Different formats used in Print production for Images (TIFF, EPS, PNG, JPEG, PDF, GIF,) Anatomy of a Digital Image.

### UNIT-II

Different types of input devices: Digital camera, Copy Dot scanner, advanced scanning techniques (Scanner

resolution and file size, Sharpness, Tone Adjustment, Colour Adjustment, Automatic Colour adjustment), Preparing originals for scanning, Scanner workflow. Advanced image editing softwares, Digital representation and Manipulation of images, Digital Colour Separation used by Advanced DTP softwares, Electronics imposition techniques and softwares.

### **UNIT-III**

Colour profiles, colour models, colour matching, colour measuring, Profile standards, colour vision testing, colour calibration techniques, colour management softwares (CMS), colour visualization and analysis, contact proofing closed loop and open loop system, Colour, communication with customers, printing specification. Three Cs of colour management – scanner calibration and characterization, Monitor calibration and characterization, printer calibration and characterization, system level colour management solutions, features and ease of use, Profiling softwares

### **UNIT-IV**

Different types of Lasers used in imaging, workflow for imaging and processing techniques, Plate setters. Networking and Electronic Publishing

#### **Course Outcomes:**

1. The students will be having detailed knowledge about latest technologies of Digital Imaging and Colour Management.
2. It will educate the students in the field of Digital imaging.
3. Students will effectively learn the usage CMS in the Industry..

#### **Text & Reference Books:**

1. Understanding Digital Colours by Phil Green- GATF publication- 1999.
2. Colour Management, 2<sup>nd</sup> edition, 1998.
3. Mastering Digital Printing 2<sup>nd</sup> Edition by Harald Johnson – Thomson publication
4. Digital Imaging by Joe Farace – Focal Press – 1998
5. The Digital Printing Handbook by Tim Daly – Argentum- 2002
6. A guide to Graphic Print Production 3<sup>rd</sup> edition by Kaj Johansson, Peter Lundberg, Robert Ryberg- John Wiley & Sons. Inc – 2011



## ADVANCED QUALITY CONTROL AND INSTRUMENTATION

General Course Information	
Course Code: <b>22MPT22C3</b>	<b>Course Assessment Methods; Max. Marks: 150 (Internal sessional:50, Theory Exam:100)</b>
Course Credit: 4	
Contact Hours: 4	For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.
Mode: Lectures Tutorials	
Examination Duration: 3 Hours and	

**Course Objective :**The course is intended to impart in-depth knowledge to various quality control parameters used in printing and to provide thorough coverage to advanced quality control instrumentation and standardization in field of printing technology.

**NOTE:** For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt 5 questions, question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.

### UNIT-I

Quality Control Definition, Objectives, Inspection, Quality Assurance, PAF model of quality costs.

Quality control in

- a) Prepress
- b) Press
- c) Post Press

### UNIT-II

Understanding UGRA, FOGRA, BIS, ISO 12647, GRACOL, SWOP standards.

Quality control patches, Color control bar, Understanding mottle, Star target, Slur bar.

### **UNIT-III**

Densitometry, Ink film thickness, Solid ink density, Dot gain, Print contrast, Hue error, Grayness, Ink trapping.

Color and color difference measurement, Tristimulus colorimeter, Spectrophotometer, Color space, Spectral reflectance curves, Color Profiles, 3 C of Color Management.

### **UNIT-IV**

Statistical Process Control, Statistical Quality Control, 6 Sigma, Just in time, Quality circle, Quality function deployment.

Implementing ISO 9000, ISO 14000 and Total Quality Management Practices.

#### **Course Outcomes:**

1. The students will learn the concept of Quality Control.
2. The students will learn about different Standards & their technical know-how.
3. The different techniques and measures for quality control provide the students a better understanding which they need in industries or during research as a successful printing technocrat.

#### **Text & Reference Books:**

1. Bob Thompton, Printing Material and Science.
2. Miles Southworth and Donna Southworth. Quality and Productivity in the Graphic Arts Publishing Company(1980)
3. Kelvin Tritton, Colour Control for Lithography, PIRA International.
4. Mortimer, A Colour Reproduction in Printing Industry PIRA International.
5. Phil Green Quality Control for Print Buyers, Blue Print
6. H.L Apfelberg and M.J. Apfleberg, Implementing Quality Management in Graphic Arts, GATF.

## PRINT TECHNOLOGY MANAGEMENT

General Course Information	
Course Code: <b>22MPT22C4</b>	<b>Course Assessment Methods; Max. Marks: 150</b> <b>(Internal sessional:50, Theory Exam:100)</b>
Course Credit: 4	
Contact Hours: 4	For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.
Mode: Lectures and Tutorials	
Examination Duration: 3 Hours	

**Course Objective:** The various perspectives of business strategy, innovation, intellect phenomenon; and productivity are being stressed upon. Forecasting is utmost important for any venture; and students are to carry with some case studies and practical past experiences/examples. Students would also interact with industry personnel for getting into latest modules.

**NOTE:** For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt 5 questions, question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.

### UNIT – I

Introduction to Technology Management. Business Strategy for New Technologies.

Technology Forecasting - Techniques of Forecasting, Technology, Forecasting-Relevance, Strategic alliance and Practicality and Technology transfer.

### UNIT - II

Management of Research, Development and Innovation – Technology mapping, Comparison of types of R & D project and development approaches- radical platform and Incremental projects, innovation process. Management Roles and Skills for New Technology

### **UNIT - III**

Management of Intellectual Property Rights - Strategic value of patents, trade secrets and licensing.  
Managing Scientists and Technologists - Identification, Recruitment, Retention, Team work and Result orientation.

### **UNIT – IV**

Technology for Managerial Productivity and Effectiveness - Just-in-Time

Venture Capital & Technology Development

- Practical Tasks - Technology forecasting and Technology Mapping
- Technology Strategy Development
  - Exercise on Just-in-Time
  - Case on Venture Capital

#### **Course Outcomes:**

1. The students will be able to work with forecasting techniques.
  2. The students will be having adequate knowledge in depth about latest technologies.
- The students will be able to use the advantages of Intellectual property rights.

#### **Text & Reference Books:**

1. Technology and Management by Cassell Educational Ltd. London
2. Management of High Technology Research and Development by John Humbleton Elsevier
3. Strategic Management by Charles W.L. Hill/Gareth R. Jones, Houghton Mifflin Co.
4. R & D Management by S.A. Bergn, Basil Basil Blackwell Inc.
5. Innovation and Entrepreneurship InOrganisations by Richard M. Burton &BiregeObel Elsevier
6. The Bank book of Forecasting- A Management Guide by Spyros Maksidakis& Steven C Wheelwright, John Wiley & Sons
7. New Product Management by C. Marle Crawford IRWIN, USA.
8. Just in Time by David Hutchin, Gower Technical Press

## MODERN SECURITY PRINTING

General Course Information	
Course Code: <b>22MPT22C5</b>	<b>Course Assessment Methods</b> <b>Max. Marks: 150</b> <b>(Internal sessional):50</b> <b>Theory Exam:100)</b>
Course Credit: 4	
Contact Hours: 4	
Mode: Lectures and Tutorials	
Examination Duration: 3 Hours	

### Course Objective

This course aims to cover advance knowledge of different types of security printing features and methods being used in printing of Currency and other secured documents along with their practical applications in modern time.

**NOTE:** For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt 5 questions, question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.

### UNIT-I

**Security Printing** : - Introduction to Security Printing, Introduction to Currency, Certificates, Postal Stamps, Judicial and Non-judicial Stamps, Identity cards, Adhar Card.

**Currency Printing** :- Introduction to Currency Printing, Incorporation of Security features in currency, Design concepts for currency, Secret Patterns, Watermarks, Fine line Printing, Micro Printing, Identification standards, Secret Patterns, etc.

### UNIT-II

**Negotiable Instruments Printing:** - Cheque Printing, Draft Printing, Cheque numbering, coded information, MICR system-magnetic ink character recognition, CBS requirements, Instruments for

identification of security features.

**Credit & Charge cards Printing:-** Credit card, Debit Card, Plastic Card for payment, Magnetically enclosed stripping, embossed information and holograms, caliper and dimensions, Protection, Signature panels, Identity Cards.

### **UNIT-III**

**Security Printing Processes:** - Introduction of security features by Sheet- fed Gravure, Sheet-fed offset, Web-fed gravure, Web-fed offset, Dry offset, Letterpress, Digital printing.

**Modern Security Techniques:** - RFID, Bar-coding, Holography, Foils, High-resolution borders, Micro printing.

### **UNIT-IV**

**Security Inks and Substrates:-** Metallic inks, Florescent Inks, OVI, Non-convention substrates : -Non tear able paper, plastic. Watermark, Security threads.

**Educational Certificates:** - Security features for Degree, DMC and other secured documents of Universities and educational institutes.

#### **Course Outcomes**

1. On completion of this course, the students will have deep understanding of various security printing methods and recent trends in security printing.
2. Students will be able to implement their knowledge for innovative printing of secured documents in upcoming era.

#### **Text & Reference Books:**

1. Printing Guide to Systems and their uses by W.R. Durrant.
2. MICR by Kant Dabholkar

## PRINT MACHINE MAINTENANCE LAB

General Course Information	
Course Code: 22MPT22C6	<b>Course Assessment Methods; Max. Marks: 100 (Internal: 50; External:50)</b>
Course Credit: 1	The end semester practical examinations will be conducted jointly by external and internal examiners.
Contact Hours: 2	
Mode: Practical	
Examination Duration: 3 Hours	

### List of Experiments -

1. Study of different advanced printing processes.
2. Study and observations of different drive systems used in high speed printing machines.
3. Study of working of narrow & large format digital presses.
4. Various types of maintenances of printing machines.

### Course Outcomes:

1. The student will learn about working of advance printing processes.
2. They will be able to understand the working of digital presses.
3. They will learn the maintenance of different printing machines.

## ADVANCED PRINTING TECHNOLOGY

General Course Information	
Course Code: <b>22MPT23D3</b>	<b>Course Assessment Methods;</b> <b>Max. Marks: 150</b> <b>(Internal sessional:50</b> <b>Theory Exam:100)</b>
Course Credit: 4	
Contact Hours: 4	
Mode: Lectures and Tutorials	
Examination Duration: 3 Hours	

### Course Objective

The objective of this course is to impart the basis knowledge of different printing processes along with their role, importance and applications.

**NOTE:** For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt 5 questions, question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.

### UNIT-I

Historical development in Printing Technology. Recent trends in the field of printing and allied technologies. Pre-Press, Press and Post press operations

### UNIT-II

Letterpress Printing Process; Characteristics, role, importance and applications. Offset Printing Process; Characteristics, role, importance and applications.

### UNIT-III

Flexography Printing Process; Characteristics, role, importance and applications. Gravure Printing Process; Characteristics, role, importance and applications.

### UNIT-IV

Screen Printing Process; Characteristics, role, importance and applications.



Digital Printing Process; Characteristics, role, importance and applications.

**Course Outcomes**

1. The learning Outcomes of this course is expected that after completion of this course the students will be having the detail knowledge of advance printing processes
2. Students will be having knowledge of the recent development in industry.
3. Students will be able to implement their knowledge for print production operations

**Text & Reference Books:**

1. Sheet-Fed Offset Technology, By Sh. Anjan Kumar Baral
2. Letterpress Printing, By C.S. Mishra
3. On demand printing, By Havoed M Fenton, Frank J. Romao
4. Printing Technology, By Adams Fox

## MAINTENANCE MANAGEMENT

General Course Information	
Course Code: <b>22MPT23D1</b>	<b>Course Assessment Methods;</b> <b>Max. Marks: 150</b> <b>(Internal sessional:50</b> <b>Theory Exam:100)</b>
Course Credit: 4	
Contact Hours: 4	
Mode: Lectures and Tutorials	
Examination Duration: 3 Hours	

### Course Objective

The objective of this course is to impart the knowledge about Reliability, Maintainability, Decision making and provisioning for different production Units.

**NOTE:** For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt 5 questions, question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.

### UNIT -I

**Reliability:** Hazard rate, mean time to failure. Hazardsmodels. Constant hazard Weibul model. System Reliability: Series, parallel and mixed configurations. K-out-of-n structure. Economics of introducing a stand by or redundancy into a production system, optimum design configuration of a series/parallel system: maximizing reliability subject to budgetary constraint optimum level of active parallel redundancy for equipment with components subject to failure.

### UNIT -II

**Maintainability:** Maintainability increment Equipment and mission availability. Replacement Decisions: Economic models block replacement policy, age replacement policy, replacement policies to minimize downtime, economics of preventive maintenance. Inspection Decisions: Optimal inspection frequency to

profit maximizing, minimization of downtime and availability maximization. Overhaul and Repair

### **UNIT -III**

**Decisions:** Optimal overhaul/repair/replace maintenance policies for equipment subject to breakdown finite and infinite time horizon optimal repair effort of a maintenance work force to meet fluctuating taking into subcontracting opportunities Spares

### **UNIT -IV**

**Provisioning :** Spares provisioning for single and multiechelon systems under budgetary constraints. Maintenance Organization: Computer application in maintenance management, MIS for maintenance.

**Rectification of Faults:** Identification and rectification of faults, Maintaining different types of Image setters, CTP, Digital and other Printing Machines.

#### **Course Outcomes**

1. The students will be having the detailed knowledge of maintenance management techniques used in printing organizations.
2. Students will able to implement their knowledge for effective maintenance and fault rectification plans for printing and packaging industries.

#### **Text & Reference Books:**

1. "Maintenance Engineering and Management", By K. Venkataraman
2. "The Handbook of Maintenance Management", By Joel Levitt
3. "Maintenance Engineering and Management", By Dr. Subhash Chandra
4. "Production and Operation Management", By Aswathappa & Shridhar

## MODERN PACKAGING TECHNOLOGY

General Course Information	
Course Code: <b>22MPT23D2</b>	<b>Course Assessment Methods;</b> <b>Max. Marks: 150</b> <b>(Internal sessional:50</b> <b>Theory Exam:100)</b>
Course Credit: 4	
Contact Hours: 4	
Mode: Lectures and Tutorials	
Examination Duration: 3 Hours	

### Course Objective

This course aims to cover advance knowledge of different types of packaging commercially being used along with their innovative practical implementations.

**NOTE:** For the end semester examination, a total of nine questions are required to be set by the examiner. Question No. 1 will be compulsory and will be having seven parts covering the whole syllabus. Other eight questions will be from the 4 Units covering two questions from each Unit. A candidate is required to attempt 5 questions, question No. 1 which is compulsory and other 4 questions, one each from each Unit. All questions carry equal marks.

### UNIT-I

Introduction to packaging, Functions, MAP, CAP, Smart and Intelligent Packaging, Ecological Aspects, 5 R- Reduce, Reuse, Recycle, Recover, Replenish, Green Packaging for Homes and Offices, Innovative trends in Package Design.

Cellulosic Materials, Processes in Cellulose Industries, Paper and Board Manufacture, Testing of Cellulose and Paper Materials, Specialty Papers, Folding Cartons, Multiwall Paper Sacks, Composite Containers.

## **UNIT-II**

Fiber board Cartons, Drugs, Glass Containers: Manufacture, Properties, Applications.

Polymer Chemistry, Classification of Polymers, Properties, Processing of Plastics, Special Plastics and Their applications, Seals, Coatings, Laminates, Adhesives, Reinforcements.

## **UNIT-III**

Cushioning Mechanism, Fragility Assessment, Cushion Design, Testing, Wooden Containers, Textile bags, Containerization and Cargo Marking. Gravure Printing Process; Characteristics, role, importance and applications.

Introduction to Design of Moulds and Tooling: Injection Moulds, Blow Moulds, Extrusion dies, Product Design.

## **UNIT-IV**

Filling of Dry and Liquid Products, Filling of Carbonated Liquids and other Packaging Techniques, Cartooning, Labeling, Thermoforming .Loss Prevention, Weights and Measures Act/ Packaged Commodities Act, Eco Regulations, Recyclability of Packaging Media and Technologies, Pollution Control, FPO, PFA, FDA, Rules and Regulations.

### **Course Outcomes**

1. After completion of this course, the students will have understanding of various packaging processes.
2. They will be able to work with the industry by knowing the latest trends.
3. Students will be able to implement this knowledge for innovative packaging environment in upcoming era.

### **Text & Reference Books:**

1. Packaging design and performance – Frank Paine.
2. Advances in Plastic Packaging Technology – John Bristol
3. Packaging Design an Introduction – Laszlo Roth
4. Packaging Technology – Vol. I, II, III – IIP
5. Handbook of Packaging Technology, EPI Edition

6. Encyclopedia of Packaging
7. Handbook of Packaging Technology, Walter Saroka

## DISSERTATION (PHASE-I)

<b>General Course Information</b>	
Course Code: <b>22MPT23C3</b>	<b>Course Assessment Methods; Max. Marks: 100 (Internal: 100)</b>
Course Credit: 5	Internal evaluation is to be done by the supervisor/Guide. The end semester presentation and viva-voce examination will be conducted by a three member committee including supervisor.
Contact Hours: 7	
Mode: Lecture, Tutorial and Practical	
Examination Duration: 3 Hours	

The topic of the Project will be decided under the guidance of concerned project guide & major dissertation will be produced in part II.

### **Course Outcomes**

1. Students will be able to make literature review.
2. Students will be able to find out the problems of Industry for the selection of research topic.
3. Students will learn to decide the methodology for data collection, data analysis and data interpretation.

## PRINT & PACKAGING QUALITY CONTROL LAB

<b>General Course Information</b>	
Course Code: <b>22MPT23C4</b>	<b>Course Assessment Methods; Max. Marks: 100 (Internal: 50; External: 50)</b>
Course Credit:1 Contact Hours:2 Mode :Practical Examination Duration: 3 Hours	The end semester practical examinations will be conducted jointly by external and internal examiners.

### List of Experiments

1. Study of characteristics of substrates (Hygroscopic and Non-hygroscopic) for all major Printing Processes.
2. Study of tests performed on Paper, Card, and Board for all printing purpose.
3. Study tests performed on Paper, Card, and Board for packaging purpose.
4. Study of tests performed on Non-paper substrates for packaging purpose.
5. Study of Testing of flexible packages and their standards.
6. Study of Testing of rigid packages and their standards.
7. Study of characteristics, requirements and standards of printing inks for all major Printing Processes.
8. Study of various ISO standards related with all major printing processes for Quality Control.
9. Study of various Quality control standard bodies related with printing and graphic communication in India, Europe and USA.

### Course Outcomes

1. The students will learn the characteristics of different substrate.
2. Students will learn about various testing parameters on paper and non paper substrate.
3. Students will be equipped with the knowledge of quality parameters of rigid & flexible packages.
4. Students will be aware of various Quality standards useful for industry.



## 22MPT24C1-- DISSERTATION AND VIVA

General Course Information	
Course Code: <b>22MPT24C1</b>	<b>Course Assessment Methods; Max. Marks: 750 (Internal: 250; External:500)</b>  Internal evaluation is to be done by the supervisor/guide. The end semester presentation and viva-voci examination will be conducted jointly by external and internal examiners.
Course Credit: 20	
Contact Hours: 20	
Mode: Lectures, Tutorials and Practicals	
Examination Duration: 3 Hours	

The Project will be under the guidance of concerned project guide & major dissertation will be produced here.

### **Course Outcomes :**

After the completion of this course the students will be able to equipped with the knowledge of:

1. Literature review techniques
2. Experimental work
3. Data collection & analysis techniques
4. To get the conclusion & findings
5. And to implement the findings of research work for the betterment of printing and packaging industries.