SCHEME OF STUDIES AND EXAMINATIONS
M. TECH. (PRINTING TECHNOLOGY)

1ST YEAR (1ST SEMESTER)

Course No.	Course title	Teaching Schedule				Credit
		L	T	P	Total	
MTPT -701	Graphics in Printing and Packaging.	3	1		4	4
MTPT -702	Print and Packaging Material and Testing.	3	1		4	4
MTPT -703	Newspaper and Multi Media Technologies.	3	1		4	4
MTPT -704	Print Entrepreneurship.	3	1		4	4
MTPT-705	Advanced Print Finishing Techniques.	3	1		4	4
MTPT – 706	Digital workflow Lab.			6	6	3
	Total	**15**	**5**	**6**	**26**	**23**

1ST YEAR (2ND SEMESTER)

Course No.	Course title	Teaching Schedule				Credit
		L	T	P	Total	
MTPT- 711	Modern Printing Systems.	3	1		4	4
MTPT- 712	Digital Imaging Techniques.	3	1		4	4
MTPT- 713	Advanced Quality Control and Instrumentation.	3	1		4	4
MTPT- 714	Print Technology Management.	3	1		4	4
MTPT- 715	Modern Security Printing	3	1		4	4
MTPT- 716	Print Machine Maintenance Lab.			6	6	3
	Total	**15**	**4**	**6**	**26**	**23**

2ND YEAR (3RD SEMESTER)

Course No.	Course title	Teaching Schedule				Credit
		L	T	P	Total	
MTPT- 700	Advanced Printing Technology (open elective for other branches of FET)	3	1		4	3
MTPT- 721(A) / MTPT 721 (B)	Program Elective	3	1		4	4
MTPT -722	Major Project (Part-I)	2			2	5
MTPT- 723	Print and Packaging Quality Control Lab.		6	6		3
	Total	**8**	**2**	**6**	**10**	**15**

2ND YEAR (4TH SEMESTER)

Course No.	Course title	Teaching Schedule				Credit
		L	T	P	Total	
MTPT-731	Major Project (Part-II)					9
	Total					**9**

Program Elective

MTPT- 721 A	Maintenance Management.
MTPT-721 B	Modern Packaging Technology.

Open elective offered by other department for printing students

ME 700	Computer Aided Design & Manufacturing
BME 700	Biomedical Instrumentation
ECE 700	Advancements in Communication System
CSE 700	Introduction to Soft Computing Techniques

MTPT-701 GRAPHICS IN PRINTING & PACKAGING

Max. Marks: 100

(Ext.; 70, Int.: 30)

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.

Outcome: The students will be able to conclude transformations (2-D & 3-D), Graphic text formats, Interactive graphics, and Processing Language etc.

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, CorelDraw etc.

UNIT – III

Graphic text formats: GIF – Graphic Image Format, TIFF – Tagged information file format, JPEG-Joint Photographer Experts Group, BMP – Bitmaps, EPS – EncapsulatedPost-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)

References:

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.

Note: 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.

MTPT-702 PRINT AND PACKAGING MATERIAL & TESTING

Max. Marks: 100

(Ext.; 70, Int.: 30)

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.

Course Out come

The learning outcome of this course is expected that after completion of this course 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 and testing techniques and they will able to implement their knowledge for quality printing and packaging.

UNIT -I

1. 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.

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

UNIT -II

3. Plastics : Polyolefins like low density polyethylene, linear low density polyethylene, high density polyethylene, metallocene, cast polypropylene, Bi-axially oriented polypropylene, pearlised BOPP, properties of polyolefins and application, manufacturing processes for polyolefins. Other plastic substrates such as polyamide, polystyrene, acrylonitritebutadience styrene, polyethylene terephthalate. Other film as Aluminium foils, metallized films etc. factors to be considered for selecting substrate for a package.

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

UNIT -III

5. 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, cobb test, chemical tests etc.

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

UNIT -IV

7. Tests on inks – Dispersion test, colour comparison by drawdown and printing, strength comparison

8. Ink-tack measurement, viscosity measurement by various viscocups such as Ford cup, Zahn cup etc.

9. Adhesion tests viscosity theory and rheology. Troubleshooting for inks and substrates.

References:

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.

Note: 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.

MTPT – 703 NEWSPAPER AND MULTIMEDIA TECHNOLOGIES

Max. Marks: 100

(Ext.; 70, Int.: 30)

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.

Outcome

Newspaper and Multimedia is a vast and exciting domain. Although the career options, a student become a skilled and creative user of current multimedia and newspaper technology.

UNIT 1

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 2

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 3

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 4

Text And Graphics:- Role of Text and Graphics in Multimedia, Working with text, Formatting text, Using fonts, 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.

RECOMMENDED 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.

Note: 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.

MTPT 704 PRINT ENTREPRENUERSHIP

Max. Marks: 100

(Ext.; 70, Int.: 30)

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.

Outcome:-Preparing Print Technocrat for fulltime involvement in his own/her occupation as an entrepreneur.

UNIT-I

1. Entrepreneurship

a) Concept/ Meaning
b) Need
c) Competencies/ qualities of an entrepreneur

2. Entrepreneurial Support System

a) District Industry Centres (DICs)
b) Commercial Banks
c) State Financial Corportions
d) 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

3. Market Survey and OpportUNITy Identification (Business Planning)

a) How to start a small scale industry
b) Procedures for registration of small scale industry
c) List of items reserved for exclusive manufacture in small scale industry
d) Assessment of demand and supply in potential areas of growth
e) Understanding business opportUNITy
f) Considerations in product selection
g) Data collection for setting up small ventures

4. Project Report Preparation

a) Preliminary Project Report
b) Techno-Economic feasibility report
c) Project Viability

5. Legal Aspects of Small Business

a) Elementary knowledge of Income Tax, Sales Tax, Patent Rules, Excise Rules.
b) Factory Act and Payment of Wages Act.

UNIT-III

6. Women Entrepreneurs

a) Main Problems of Low Women Entrepreneurship in India

b) Important Schemes for women Entrepreneurs

UNIT-IV

7. Environmental considerations

a) Concept of ecology and environment

b) Factors contributing to Air, Water, Noise pollution

c) Air, water and noise pollution standards and control

d) Personal Protection Equipment (PPEs) for safety at work places

8. Status of Printing Industry in India

a) Current scenario of printing industry in India

b) Case study on Indian printing industry

RECOMMENDED 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, SatyaPrakashan, 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.

Note: 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.

MTPT-705 ADVANCED PRINT FINISHING TECHNIQUES

Max. Marks: 100

(Ext.; 70, Int.: 30)

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

Outcome: At the end of this course the student should be able to understand the concept of Various finishing techniques, Finishing materials and Different forms of packaging.

UNIT -1

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

UNIT-2

3. Concept of CIP3, CIP4.
4. Lamination techniques and UV curing.

UNIT -3

5. Extrusion process and Co-extrusion techniques.
6. Plastic used in Packaging: Polyethylene (HDPE, LDPE, LLDPE, Others), Polypropylene, Polystyrene, Polyvinyl chloride, Polyethylene teraphthalate, Polyvinyl acetate, Polyvinyl alcohol, Ethylene vinyl alcohol etc.

UNIT-4

7. Concept of Shrink and stretch packaging.
8. 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.

Reference

1. Binding, finishing and mailing: The final word T.J. Tedesces, 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, 2nd edition.

Note: 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.

MTPT- 706 DIGITAL WORKFLOW LAB

Max. Marks: 100

(Ext.; 70, Int.: 30)

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, 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

MTPT-711 MODERN PRINTING SYSTEMS

Max. Marks: 100

(Ext.; 70, Int.: 30)

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.

Outcome: The students will be able to conclude about Modern Printing Systems and various perspectives associated with it.

UNIT – I

1. Computer aided offset presses, PEC, PEM, PECOM, CIP3, CIP4 Technology.
2. Drive systems for offset presses, pneumatics, hydraulics, common shafts and shaft-less.
3. Hi-Fi color printing.
4. Automatic plate mounting systems for offset presses.
5. Driography process, Security Printing, Non Impact Process.
6. Trouble shooting in offset presses.
7. Other printing processes like Pad printing, screen printing, heat transfer, tampon printing.

UNIT - II

8. Digital and customized printing.
9. DI Presses
10. Understanding press functions and how they are controlled.
11. Image carriers for gravure- functions, variables in plating, hardness, calculation.
12. 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

13. 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.

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

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

UNIT - IV

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

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

18. Digital Printing – Integration for Packaging application – such as label.

19. Hybrid systems such as Gravure – Flexo, Offset, Gravure etc.

References:

1. On demand printing by Havoed M Fenton Frank J. Romao, 1st edition, 1998
2. Developments in Web Offset by Bob Durrant.
3. Comparative guide to direct – to – press technology. 2nd edition-1999, By Molly J. Joss.
4. Gravure process and technology – Gravure Education foundation- Gravure Association of America.
5. Flexography 2nd Edition – Pira Visual Aid.
6. Modern Gravure Technology by Harry B. Smith – Pira International.
7. Advancements in Printing Plate Technology by Steve Doyle – Pira International.
8. High Quality Flexography by Tony White – Pira International.

Note: 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.

MTPT -712 DIGITAL IMAGING TECHNIQUES

Max. Marks: 100

(Ext.; 70, Int.: 30)

Course Objective:

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

Course out Come:

The learning out come after completing this course is expected that students will be having detailed knowledge about latest technologies of Digital imaging and colour. It will educate the students in the field of Digital imaging.

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, Platesetters. Networking and Electronic Publishing

References:

1. Understanding Digital Colours by Phil Green- GATF publication- 1999.
2. Colour Management, 2nd edition, 1998.
3. Mastering Digital Printing 2nd 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 3rd edition by Kaj Johansson, Peter Lundberg, Robert Ryberg- John Wiley & Sons. Inc – 2011

Note: 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.

MTPT-713 ADVANCED QUALITY CONTROL AND INSTRUMENTATION

Max. Marks: 100

(Ext.; 70, Int.: 30)

Course Objectives

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.

Course Outcome

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.

UNIT-1

1. Quality Control Definition, Objectives,Inspection, Quality Assurance, PAF model of quality costs.
2. Quality control in
    a) Prepress
    b) Press
    c) Post Press

UNIT-2

3. Understanding UGRA, FOGRA, BIS, ISO 12647, GRACOL, SWOP standards.
4. Quality control patches, Color control bar, Understanding mottle, Star target, Slur bar.

UNIT-3

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

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

UNIT-4

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

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

References:

1. Bob Thomption, 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, AColour 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.

Note: 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.

MTPT-714 PRINT TECHNOLOGY MANAGEMENT

Max. Marks: 100

(Ext.; 70, Int.: 30)

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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.

Outcome: It will help the students to get the know-how of present business aspects based on the subjective & objective calculations of past references.

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

References:

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 Miffin 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

Note: 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.

MTPT- 715 MODERN SECURITY PRINTING

Max. Marks: 100

(Ext.; 70, Int.: 30)

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.

Course Outcome

Upon completion of this course, the students will have understanding of various security printing methods and the recent trends in security printing. They can implement this knowledge for innovative printing of secured documents in upcoming era.

UNIT I

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

2. **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

3. **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.

4. **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

5. **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.

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

UNIT IV

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

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

References:

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

Note: 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.

MTPT-716 PRINT MACHINE MAINTENANCE LAB.

Max. Marks: 100

(Ext.; 70, Int.: 30)

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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.

MTPT-700 ADVANCED PRINTING TECHNOLOGY

Max. Marks: 100

(Ext.; 70, Int.: 30)

Course Objective

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

Course Outcome

The learning outcome of this course is expected that after completion of this course the students will be having the detail knowledge of various printing processes and the recent development in this industry and they will implement their knowledge for print production operations.

UNIT-1

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

UNIT-2

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

UNIT-3

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

UNIT-4

7. Screen Printing Process; Characteristics, role, importance and applications.
8. Digital Printing Process; Characteristics, role, importance and applications.

References:

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

Note: 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.

MTPT-721 (A) MAINTENANCE MANAGEMENT

Max. Marks: 100

(Ext.; 70, Int.: 30)

Course Objective

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

Course Out come

The learning outcome of this course is expected that after completion of this course the students will be having the detailed knowledge of maintenance management techniques and they will able to implement their knowledge for effective maintenance and fault rectification plans for printing and packaging UNITs.

UNIT -I

Reliability:

Hazard rate, mean time to failure. Hazards models. 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.

Note: 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.

MTPT-721 (B) MODERN PACKAGING TECHNOLOGY

Max. Marks: 100

(Ext.; 70, Int.: 30)

Course Objective

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

Course Outcome

Upon completion of this course, the students will have understanding of various packaging processes and the recent trends in this industry. They can implement this knowledge for innovative packaging environment in upcoming era.

UNIT-1

9. 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.

10. 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-2

11. Fibreboard Cartons, Drugs, Glass Containers: Manufacture, Properties, Applications.
12. Polymer Chemistry, Classification of Polymers, Properties, Processing of Plastics, Special Plastics and Their applications, Seals, Coatings, Laminates, Adhesives, Reinforcements

UNIT-3

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

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

UNIT-4

15. Filling of Dry and Liquid Products, Filling of Carbonated Liquids and other Packaging Techniques, Cartoning, Labeling, Thermoforming.
16. 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**.**

References:

1. Packaging design and performance – Frank Paine.
2. Advances in Plastic Packaging Technology – John Bristool
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

Note: 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.

MTPT-722 MAJOR PROJECT (PART-I)

Max. Marks: 100

(Ext.; 70, Int.: 30)

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

MTPT-723 PRINT & PACKAGING QUALITY CONTROL LAB.

Max. Marks: 100

(Ext.; 70, Int.: 30)

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.

MTPT-731 MAJOR PROJECT (PART-II)

Max. Marks: 100

(Ext.; 70, Int.: 30)

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