Department of Printing and Media Engineering

The Department of Printing and Media Engineering has the distinction of being the one among the only few institutes across India offering bachelor's degree since 1992. Department has been growing ever since to reach the present status of having international standard infrastructure and state-of-the-art facilities. Some of the department highlights are mentioned below:

Department highlights

- MOU with Chemnitz University of Technology, Germany for joint R&D projects, faculty and student exchange
- DAAD Scholarship for student exchange programme with Chemnitz University of Technology, Germany.
- Equipped with the state of the art laboratories with the most sophisticated equipments.
- Ample opportunities for placement (Nearly 100%) in both India and Abroad
- Long term relationship with leading industries to develop a good industry-institute interaction
- Hands on training in Manipal Technologies Ltd., one of the leading Printing and Media Organizations in Asia
- Regularly conducting National / International Conferences, Workshops, and Seminars.

A Memorandum of Understanding has also been signed with the Chemnitz University of Technology, Germany for a Joint Double Degree Masters program. Students admitted in Manipal, who opt this Joint Double Degree Masters program programme will be awarded M.Sc. degree in "Print and Media Technology" by Chemnitz University of Technology and M.Tech degree in "Printing and Media Technology" by Manipal University. Students selecting this program, study one year in India and one year in Germany.

Academic Programmes Offered

- B.Tech. in Print and Media Technology (since 1992)
- M.Tech. in Printing and Media Technology (since 2008)
- Joint Double Degree Masters Program in collaboration with Chemnitz University of Technology, Germany

Facilities and Resources

Faculty of the department are actively involved in research activities in the areas of Color Science, Production Management, and Print Applied Research. Department also provides consultancy services to the printing and packaging industry in the area of quality testing of paper, board, ink, packages and color measurement & management.

Department has professionally qualified faculty both with Academic and Industry background. It has ten fulltime faculty members including one Professor, one Assistant Professor Selection Grade and three Assistant Professor Senior Scale. Three Adjunct Professors and more than ten faculty from other departments are also associated with the program.

The department is equipped with the most latest and modern equipment like: Esko Graphics Packaging Software, Cape Pack Packaging Software, Epson Stylus Pro 7900, TechNovaPoliRip, Navigator RIP software, Epson A3 Scanner 20000, Liquid Photopolymer Plate Maker, Emulsification Tester, Viscosity Tester, Oil absorbance Tester, Air Knife Coater, IGT Printability Tester, Mini Carton Compression Tester, Ink Rub Resistance Tester, Ring Crush Tester, Crown size Offset machine (AUTO PRINT), Semiautomatic Screen Printing Machine, Flexo-cum-RotoGravure Hybrid Printing Machine, Xrite 530 Spectro-densitometer, X-rite Plate Scope, Konica Minolta SpectroDensitometer, X-rite ColorMunki Photo, X-rite i1iO Extreme, X-rite i1 Basic, ProfileMaker 5 Platinum, DSLR Nikon D7000 18-105mm, Paper Brightness-Opacity Tester, KPP Flexo Proofer, Combo Thermal and Adhesive Laminating Machine, UV varnishing... are a few to mention.

In addition to Central Library, department has a separate well stocked Department Library.

Proximity to Manipal Power Press Limited, one of the leading printing organizations in Asia, gives an added advantage in having hands on training to students on each and every aspect of a print house which helps them to gain thorough practical knowledge about the subjects during the course of study.

Faculty List

Professor and Head
Prof Dr Prakash Shetty, Ph.D (Mangalore University)

Assistant Professor - Selection Grade:
Ms Asha S Pai, BE, MBA

Assistant Professor Senior - Scale
Mr Nagaraj Kamath, M.Tech
Mr Ramakrishna Nayak, M.Tech, MBA
Mr Vinod T Kamath, M.Tech, MBA
Mr Ramnath Shenoy, M.Tech, MBA

Assistant Professors
Ms Soujanya S Shenoy, BE, MBA
Mr Sandeep Nayak Pangal, MBA, M.Tech
Ms Bhagya R S, BE, M.Tech
Mr Devicharan R, BE, M.Tech
Mr Nithesh Kumar K S, BFA, MVA (on contract)

B. Tech in PRINT AND MEDIA TECHNOLOGY

Year	THIRD SEMESTER						FOURTH SEMESTER					
	Sub. Code	Subject Name	L	T	P	C	Subject Code	Subject Name	L	T	P	C
II	MAT 2106	Engineering Mathematics – III	2	1	0	3	MAT 2209	Engineering Mathematics – IV	2	1	0	3
	PMT 2101	Basics of Print Media	3	0	0	3	PMT 2201	Offset Printing	4	0	0	4
	PMT 2102	Imaging Techniques	4	0	0	4	PMT 2202	Printing Material Science – II	4	0	0	4
	PMT 2103	Electronic Composition	4	0	0	4	ECE 2231	Audio and Video Signals	4	0	0	4
	PMT 2104	Printing Material Science – I	3	0	0	3	PMT ****	Programme Elective – I	3	0	0	3
	PMT 2105	Fundamentals of Electronic Media	3	0	0	3	*** ****	Open Elective – I	3	0	0	3
	PMT 2111	Imaging Techniques Lab	0	0	3	1	PMT 2211	Printing Material Testing Lab	0	0	3	1
	PMT 2112	Electronic Composition Lab	0	0	3	1	ECE 2251	Audio and Video Signals Lab	0	0	3	1
			20	**1**	**6**	**22**			**21**	**1**	**6**	**23**
III	FIFTH SEMESTER						SIXTH SEMESTER					
	PMT 3101	Flexography, Gravure & Screen Printing	4	0	0	4	HUM 4001	Essentials of Management	2	1	0	3
	PMT 3102	Digital and Security Printing	4	0	0	4	PMT 3201	Print Finishing and Converting	4	0	0	4
	PMT 3103	Color Analysis and Reproduction	4	0	0	4	PMT 3202	Video Processing	4	0	0	4
	PMT 3104	Sound Engineering	4	0	0	4	PMT ****	Programme Elective – III	3	0	0	3
	PMT ****	Programme Elective – II	3	0	0	3	PMT ****	Programme Elective – IV	3	0	0	3
	PMT 3111	Color Analysis and Reproduction Lab	0	0	3	1	*** ****	Open Elective – II	3	0	0	3
	PMT 3112	Printing Machine Lab	0	0	6	2	PMT 3211	Print Finishing and Converting Lab	0	0	3	1
	PMT 3113	Sound Engineering Lab	0	0	3	1	PMT 3212	Video Processing Lab	0	0	3	1
			19	**0**	**12**	**23**			**20**	**1**	**6**	**22**
IV	SEVENTH SEMESTER						EIGHTH SEMESTER					
	HUM 4002	Engineering Economics and Financial Management	2	1	0	3	PMT 4297	Seminar				1
	PMT 4101	Package Design and Testing	3	0	0	3	PMT 4298	Industrial Training				1
	PMT 4102	Media production	2	0	6	4	PMT 4299	Project Work/Practice School				12
	PMT 4103	Animation Technology	3	1	0	4						
	PMT ****	Programme Elective – V	3	0	0	3						
	PMT ****	Programme Elective – VI	3	0	0	3						
	PMT 4111	Package Design and Testing Lab	0	0	3	1						
	PMT 4112	Animation Technology Lab	0	0	3	1						
			17	**2**	**12**	**22**						**14**

Minor Specialisations

I. Packaging Technology

1. PMT 4001: Packaging Applications
2. PMT 4002: Packaging Materials
3. PMT 4003: Packaging Techniques and Processes
4. PMT 4004: Smart Packaging

II. Business Management

1. HUM 4011: Financial Management
2. HUM 4012: Human Resource Management
3. HUM 4013: Marketing Management
4. HUM 4014: Operations and Systems Management

Other Programme Electives

1. PMT 4005: Advertising Theory and Practice
2. PMT 4006: Communication Systems
3. PMT 4007: Continuous Stationery & Specialty Printing
4. PMT 4008: Digital Photography
5. PMT 4009: E-Publishing
6. PMT 4010: Green Printing
7. PMT 4011: Media Accounting and Management
8. PMT 4012: Media Entrepreneurship
9. PMT 4013: Packaging Management
10. PMT 4014: Print Maintenance Engineering
11. PMT 4015: Printronics
12. PMT 4016: Quality Management for Graphic Arts
13. PMT 4017: Radio Technology
14. PMT 4018: Television Technology
15. MCA 4001: Graphics and Web Design

Open Electives

1. PMT 3281: Fundamentals of Advertising
2. PMT 3282: Global Media and Entertainment
3. PMT 3283: Graphic Designing
4. PMT 3284: Newspaper Technology
5. PMT 3285: Packaging Design and Development
6. PMT 3286: Publishing Science

THIRD SEMESTER

MAT 2106: ENGINEERING MATHEMATICS - III [3 0 0 3]

Fourier series, periodic functions, Half range expansions. Harmonic analysis.Vector Calculus: Gradient, divergence and curl Line, surface and volume integrals, Green's, Divergence and Stoke's theorems Statistics mean, median, mode, and quartiles. Measures of dispersion, coefficient of correlation, Regression lines, Curve fitting. Partial differential equations: one-dimensional wave and heat equations and their solutions.

References:

1. Erwin Kreyszig*, "Advanced Engineering Mathematics"*, (5e). 1985 Wiley Eastern.
2. Murray R. Spiegel*, "Vector Analysis"*, Schaum Publishing Co., 1959
3. B. S. Grewal*, "Higher Engineering Mathematics"*, Khanna Publishers, 1989

PMT 2101: BASICS OF MEDIA TECHNOLOGY [3 0 0 3]

Print Media: The world of print media, industries and their classifications, printed products. Pre-media, workflow - pre-press, press and post-press, print production technologies. Conventional Print Media Technology: Relief printing, Recess printing, Lithographic printing and screen printing. Digital Print Media Technology - Computer to press/direct imaging technologies, Functional components in NIP technologies, system concepts/architecture of NIP systems. Hybrid Print Media Technology. Special Print Media Technology - Security printing, Business form printing, label printing, pad printing, 3D printing, lenticular printing and their areas of applications.

References:

1. Kipphan Helmut, "*Handbook of Print Media Springer*", Germany, 2001
2. Adams J. M. and Dolin P. A, "*Printing Technology",* (5e), Delmar, Inc. Thomson Learning, New York, USA, 2002.
3. Dejidas L. P. and Destree T. M, "*Sheet fed Offset Press Operating*" (3e), PIA/GATF Press, Pittsburgh, 2005.
4. Wilson D. G. and PIA/GATF Staff) "*Web Offset Press Operating*",(5e), PIA/GATF Press, Pittsburgh, USA. 2003.
5. Samuel B.H, Screen Printing "*Contemporary Approach*", Delmar publisher, New York, 1997.

PMT 2102: IMAGING TECHNIQUES [4 0 0 4]

Conventional film reproduction: Cameras, Light sensitive materials - films and papers, Processing chemicals, techniques and equipment. Line and Halftone Photography: Line and Screened reproductions, screens and exposures, handling copy, evaluation of photographic image. Digital Screening: Amplified Modulation (AM) and Frequency Modulation (FM) screening. Computer to Film: workflow, equipment and films for CTF. Layout and film assembly: Folding and Impositions methods, planning a layout, Materials and Methods of planning, registration system. Image carriers for Planography: Modern offset plates, Quality control aids and equipment. Image carriers for Flexography: Plate materials, production of plates, Laser engraved design rolls, sleeves. Image carriers for Gravure: cylinder parameters and designs, methods and process of cylinder making. Image carriers for Screen Printing: Fabrics, Frames, Fabric stretching, Photographic Stencil making methods. CTP for all processes.

References:

1. Kipphan Helmut, "*Hand book of print media*", Springer, Germany. 2001
2. Cogoli J. E, "*Graphic arts photography: Black and White*", GATF, USA,1993
3. Adams J. M. and Dolin P. A, "*Printing Technology*", Fifth Edition, Delmar, Inc. Thomson Learning", New York, USA 2002
4. Ray Blair and Thomas M.D, "*Flexography - Principle and Practices, Foundation of Flexographic Technical Association*", USA, 1991.
5. Samuel B.H, "*Screen Printing - Contemporary Approach*" Delmar publisher, New York, 1997.

PMT 2103: ELECTRONIC COMPOSITION [4 0 0 4]

Role of Composition department in Printing Industry, Evolution of Typography, Font, Basic four-line principle, Fundamental strokes of a type. Typographical measurement, Size of type, page widths and depths, recognition of type faces, Factors for choosing typeface, typographic commandments. Casting off. Automatic input &, human input, optical character recognition, automatic voice recognition. Scanning, photo multiplier tubes, charge coupled device, Digital File Basics, file storage formats, file compression. Post Script (PS), encapsulated PS. Electronic Publishing-Definition, Workflow. Optical center and geometric center. Basic elements & basic principles of design. Media design & planning-General rules for makeup. Page makeup for different printed communications. Composition Software - Automatic Page Make up, text and graphics Integration, Page display. Presentation of proofs.

References:

1. Kaj Johansson, Peter Lundberg, Robert Ryberg, "*A Guide to Graphic Print Production*", (2e), John Wiley & sons, New Jersy, 2007.
2. Speirs H, *"Introduction to Prepress"*, (2e), Pira International, UK, 2003
3. Hal Hinderliter, *"The GATF guide to Desktop Publishing"*, (3e), GATF Press, 2000.
4. David Bergsland, *"Printing in a Digital World",* Delmar Publishing, Albany, 1997.

PMT 2104: PRINTING MATERIAL SCIENCE - I [3 0 0 3]

Manufacture of Paper -Invention of paper, technical developments, raw materials. Stages of pulping, Stages of paper making, Computer applications in the machine. Coating paper, Storage and handling of paper. Paper Recycling - secondary fiber, stages of making recycled paper, de-inking plant and chemistry. Printing ink ingredients - Properties, types and applications. Manufacture of printing inks - Stages of ink manufacturing - Mixing, milling and filtration. Storage and handling of inks. Inkplant. Image carrier materials. Blankets and roller materials. Chemicals for printing, properties and applications.

References:

1. Bureau H William, "*What the Printer should know about Paper"*, GATF, USA, 1989.
2. Bob Thompson, "*Printing Materials Science and Technology*", PIRA, UK, 1998.
3. Ronald E.T, *"Printing inks formulation principles, manufacture and quality control testing procedures"*, PIRA International, UK,2000.
4. Nelson R.E. and Terry Scarlett, *"What the printer should know about ink"*, GATF, USA, 1990.
5. Dejidas L.P. and Destree T. M, *"Sheet fed Offset Press Operating"*, Printing Industries Press, Pittsburgh, 2005.

PMT 2105: FUNDAMENTALS OF ELECTRONIC MEDIA [3 0 0 3]

Analog and digital radio &TV, cable TV, camera and consols, Internet radio and TV, digital media production, web based social interaction, TV transmission standards, receiving systems, mobile phone media production and delivery, video on demand, Satellite distribution, satellite links, earth stations, broadcasting vehicle and mobile control room, Information technology: Computer storage, Computer networks, Internet streaming, Web Streaming, Audio and video streaming, Flash streaming, MP3 streaming (radio), Peer to Peer distribution Digital video broadcasting via satellite services to handhelds (DVB-SH) Technology, Geo-spatial technology, Wi-fi and Wi-Max, podcasting, i-Pod, Information superhighways, Interactive portals.

References:

1. Brian Winston, *"Media Technology and Society: A History from the Telegraph to the Internet"*, Rutledge,2000.
2. David E Reese and Lynne S. Gross, *"Radio Production Work text: Studio and Equipment",* Focal Press, 2002.
3. Graham Jones A, *"Broadcast Engineering Tutorial for Non-Engineers"*, Focal Press, 2005.
4. E.P.J. Tozer, *"Broadcasting Engineering Reference Book"*, Focal Press, 2004.
5. Borko Furht and Syed A. Ahson, *"Handbook of Mobile Broadcasting"*, Taylor & Francis, 2008.

PMT 2111: IMAGING TECHNIQUES LAB [0 0 3 1]

List of experiments:

1. Imposition methods for book work and folders
2. Preparation of conventional layout.
3. Conventional planning and film assembly for plate making.
4. Digital impositions
5. Familiarization of RIP software, workflow and parameter control
6. Page layout and imposition using RIP software for proofing.
7. Page layout and imposition using RIP software for CTF.
8. Preparation of linearized masters for small offset press
9. Study of effect of exposure factors and development factors on quality of the plate.
10. Conventional processing and automatic processing for pre-sensitized (PS) plate making under standard conditions.
11. Photopolymer plate making for flexographic pocess.
12. Screen stretching techniques and stencil preparation

References:

1. Tech Nova PoliRIP, *"User Manual",* Technova, 2009.
2. Adams J. M. and Dolin P. A, *"Printing Technology"*, (5e), Delmar, Inc. Thomson Learning T M, New York, USA.2002.
3. Kipphan Helmut, *"Handbook of Print Media"*, Springer, Germany, 2001.
4. Peck H.L, *"Stripping: The Assembly of Film Images"*, GATF, USA, 1994.

PMT 2112: ELECTRONIC COMPOSITION LAB [0 0 3 1]

List of Experiments:

1. Review of Electronic Composition, Microsoft Word - Table work, Tabular work, fonts and type styles, word-art, column works.
2. Microsoft Power Point - Working with tools, Making good presentations and Seminars
3. Adobe Photo Shop - Familiarizing and practice with the PhotoShop tool-bar

4. Adobe Photo Shop - Working with Layers and Masking, Picture editing, scanning the picture, Converting image formats, resizing the images
5. Adobe Photo Shop - Picture and text manipulation
6. Adobe Photo Shop - Designing and Practicing
7. CorelDraw - Familiarizing and practice with the CorelDraw tool-bar
8. CorelDraw - Picture editing and Designing
9. CorelDraw - Designing and Practicing
10. Adobe PageMaker - Familiarizing and practice with the PageMaker tool-bar
11. Adobe PageMaker - Designing of visiting cards, page makeup of pamphlets, page make up of advertisements, folders, journals, book work
12. Adobe PageMaker - Designing and Practicing of cover pages

References:

1. Kaj Johansson, Peter Lundberg, Robert Ryberg, *"A Guide to Graphic Print Production"*, (2e), John Wiley & sons, New Jersy,2007.
2. Speirs H, *"Introduction to Prepress"*, (2e), Pira International, UK,2003.
3. Hal Hinderliter, *"The GATF guide to Desktop Publishing"*, (3e), GATF Press,2000.
4. David Bergsland, *"Printing in a Digital World",* Delmar Publishing, Albany,1997.

FOURTH SEMESTER

MAT 2212: ENGINEERING MATHEMATICS - IV [2 1 0 3]

Finite difference solution of boundary valued problems. Numerical solutions of Laplace and Poisson, heat and wave equations. Introduction to probability, finite sample space, conditional probability and independence, Baye's theorem, one dimensional random variable: mean and variance, Chebyschev's inequality.

Two and higher dimensional random variables, covariance and correlation coefficient. Distributions: binomial, poisson, uniform, normal, exponential gamma and chi-square. Optimization: Linear programming problem, Graphical and Simplex methods, penalty cost and two phase methods. Transportation problem

References:

1. P. L. Meyer, *"Introduction to probability and Statistical applications"*, (2e), , Amerind Publishing Co., 1975
2. S. S. Sastry, *"Introductory methods for Numerical Analysis",* (2e), PHI, 1990
3. Erwin Kreyszig, *"Advanced Engineering Mathematics",* (5e) 1985 Wiley Eastern.
4. Narayanan Ramaniah and Manicavachagom Pillay, *"Advanced Engineering Mathematics*", Vol 3
5. Hamdy A Taha, *"Operation research",* (7e), PHI.

PMT 2201: OFFSET PRINTING [4 0 0 4]

Feeding Mechanisms: Sheet fed - Feeding principles and types, sheet transport and control. Web fed - Roll stand, dancer roller, splicers. Printing Unit: Plate, blanket, impression and transfer cylinder. Plates and blankets- types, selection, mounting and care. Cylinder Setting, Packing and Printing Pressure. Press configurations for sheet fed and web presses. Inking system: functions, construction, roller setting, operation, maintenance. Dampening system: conventional, continuous flow and non- contact dampening system. Delivery systems: delivery systems for sheet fed - types, sheet guiding devices, delivery assist devices, IR and hot air drying, UV drying. Delivery systems for web presses dryers and chill rolls, Folders and In-line finishing. Press Controls: Web tension, web guiding, cut-off control. Make ready, press run, run length, and monitoring devices. Auxiliary equipments. Offset Problems: Identification, causes and remedies of problems related to ink, paper, plate and press on sheet fed and web presses. Material handling, maintenance and press room safety. Waterless printing: Principle, process, plates, advantages, limitations and applications.

References:

1. Dejidas L.P. and Destree T. M, *"Sheet fed Offset Press Operating"*, PIA/GATF Press, Pittsburgh, 2005.
2. Kipphan Helmut, *"Hand Book of Print Media"*, Springer, Germany,2001.
3. Daniel G Wilson and PIA/GATF Staff, *"Web Offset Press Operating"*, PIA/GATF Press, Pittsburgh,2005.
4. GATF Staff, *"Solving Sheet fed Offset Press Problems"*, GATF, USA,1994.
5. GATF Staff, *"Solving Web Offset Press Problems"*, GATF, USA,1990.

PMT 2202: PRINTING MATERIAL SCIENCE - II [4 0 0 4]

Introduction to printing substrates and inks. Paper Properties and Testing - Structural, surface, mechanical, optical, and chemical properties. Paper testing and equipment used. Substrates for different printing processes - Paper types and their application, Paper Boards, their properties and testing. Plastic, metallic and other substrates. Paper metrics - Paper measurement systems, paper sizes. Ink drying mechanisms. Ink Properties and Testing Optical, working and end use properties. Inks for different printing processes - types and formulation. Toners formulations, properties and applications.

References:

1. Bureau H William, *"What the Printer should know about Paper"*, GATF, USA,1989.
2. Eves Ian, *"Paper, Blueprint"*, London,1991.
3. Finley Charles, *"Printing Paper and Inks",* Delmar Publishers, New York,1997.
4. Bob Thompson, *"Printing Materials Science and Technology"*, PIRA, UK,1998.
5. Prakash Shetty, *"Science and Technology of Printing Materials"*, MJP Publishers, Chennai, 2008.

ECE 2231: AUDIO AND VIDEO SIGNALS [4 0 0 4]

Introduction to Multimedia System, Architecture and components, Multimedia distributed processing model, Synchronization, Orchestration and Quality of Service (QOS) architecture. Data acquisition, Sampling and Quantization, Human Speech production model, low bit rate speech compression, MPEG audio compression. Image acquisition and representation, image compression standards: ITU (formerly CCITT) Group III and IV standards, JPEG image compression standards, MPEG video compression standards, digital audio and broadcasting, Video coding and compression, H261, HDTV-DVB-T, Fundamentals of data communication and networking, Audio latency, Video data rate, multimedia over LAN and WAN, Multimedia conferencing, Multimedia Information Systems.

References:

1. Ralf Steinmetz and Klara Nahrstedt, *"Multimedia Systems"*, Springer.

2. J. D. Gibson, *"Multimedia Communications: Directions and Innovations"*, Springer.
3. K. Sayood, *"Introduction to Data Compression"*, Morgan-Kaufmann.
4. A. Puri and T. Chen, *"Multimedia Systems, Standards, and Networks"*, Marcel Dekker.
5. Iain E.G. Richardson, *"H.264 and MPEG-4 Video Compression"*, John Wiley.
6. Borivoje Furht, *"Handbook of Multimedia Computing",* CRC Press.

PMT 2211: PRINTING MATERIAL TESTING LAB [0 0 3 1]

List of experiments:

Paper Testing:

1. GSM & Ash content
2. Bursting strength
3. Cobb sizing & Moisture content
4. Folding endurance
5. Tearing strength
6. Tensile strength
7. Porosity, Softness and smoothness
8. Brightness, Opacity and gloss
9. Stiffness
10. pH

Ink Testing:

11. Fineness of grind
12. Wet ink film thickness and Ink length

References:

1. Ronald E.T, *"Printing inks formulation principles, manufacture and quality control testing procedures"*, PIRA International, UK, 1994.
2. Bureau H William, *"What the Printer should know about Paper",* GATF, USA,1989.
3. Finley Charles, *"Printing Paper and Inks"*, Delmar Publishers, New York,1997.
4. *"Paper, Ink and Press Chemistry"*, Sappi Europe SA 2004,The eighth technical brochure from Sappi, Sappi Fine Paper Europe, Sappi Europe SA, 154 Chausseé de la Hulpe, B-1170 Brussels.
5. *"Paper Standards & Measurements"*, 2007 Sappi Europe SA A technical brochure from Sappi, Sappi Fine Paper Europe, Sappi Europe SA, 154 Chausseé de la Hulpe,B-1170 Brussels.
6. ISO 12647-2:2004(E), © ISO 2004, International Standard, ISO 12647-2, Second edition, 2004.

ECE 2251: AUDIO AND VIDEO SIGNALS LAB [0 0 3 1]

List of experiments:

1. Introduction to MATLAB Programming
2. Signal generation (periodic, non-periodic, discrete time and continuous time signals)
3. Sampling and reconstruction of signals (aliasing , Nyqist rate)
4. Audio & Video signal generation and manipulation
5. Video signal generation and manipulation
6. Experiments on Multimedia systems
7. Experiments on Multimedia communication.

References:

1. Ralf Steinmetz and Klara Nahrstedt, *"Multimedia Systems",* Springer.
2. J. D. Gibson, *"Multimedia Communications: Directions and Innovations"*, Springer.
3. K. Sayood, *"Introduction to Data Compression",* Morgan-Kaufmann.
4. A. Puri and T. Chen, *"Multimedia Systems, Standards, and Networks"*, Marcel Dekker.
5. Iain E.G. Richardson, *H.264 and MPEG-4 Video Compression*, John Wiley.
6. Borivoje Furht, *"Handbook of Multimedia Computing"*, CRC Press.

FIFTH SEMESTER

PMT 3101: FLEXOGRAPHY, GRAVURE AND SCREEN PRINTING [4 0 0 4]

Flexography - principle, products and market, Packaging and publication flexography, press components and configurations, narrow and wide web presses Web handling and control - types of unwind and rewind, tension and tension control systems, web guides. Flexographic press - Inking systems, Fountain , anilox, plate and impression roll/drum, plate Mounting and proofing, flexo dryers, doctor blade. Press, print, web and plate problems. Gravure - principle, products and market, sectors of gravure. Press components and configurations. Indirect gravure and hybrid systems. Gravure press - inking systems, printing units, doctor blade assembly, Impression cylinder and ESA. Dryers and heat sources. Press, print and web problems. Screen printing - principle, Methods of printing, essential components of screen printing, Screen printing market and products, special areas of applications. Screen printing press - types of presses and components, mesh, stencil and squeegee - parameters for controlling print quality, flood bar, special squeegees and techniques, maintenance and storage, multicolour printing and halftone reproduction. Types of dryers. Mesh, stencil and squeegee, press and, print problems. Environment and Sustainability - Environmental issues, Solvent recovery plant and press room safety.

References:

1. Blair Ray and Destree T. M, "*Flexography - Principle and Practices"*, (5e), Foundation of Flexographic Technical Association, USA,1999.
2. Ray Blair and Thomas M.D, "*Gravure Process and Technology"* GAA, USA, 1991.
3. Weiss H. L., "*Gravure and Flexographic Printing Presses"*, Converting Technology Corp, USA, 1985
4. Herbert L.W, "*Gravure and flexographic Printing Presses",* Converting Technology Corp, USA. 1985
5. Samuel B.H, "*Screen Printing - Contemporary Approach"*, Delmar publisher, New York,1997.
6. Harry and Smith, "*Modern Gravure Technology A Literature Review",* Pira International, UK,1994.

PMT 3102: DIGITAL AND SECURITY PRINTING [4 0 0 4]

Digital Prepress- Creating and processing digital images, Screening techniques, File formats Raster image processor (RIP), Workflow integration, Preflighting, Color management for digital printing. Digital Proofing - digital and analogue proofing, Halftones simulation (dot proofing), Remote proofing, ISO, SWOP/ GRACoL, Ugra/Fogra certification for proofing systems. Digital PrintingTechnology - Working principle, construction,consumables electro photography, ink-jet, thermography, CTP (direct imaging DI), Inline operation configurations, Environmental implications.Digital Workflow & Applications: Commercial printing, Publication printing, Newspaper printing, Variable Data Printing, Digital printing on metal, fabric & wood, Black & white photography printing, Mono color digital printing, Barcode printing,

Watermark printing, Printed electronics. Quality Control: Image quality attributes, Print quality verification tools and Print Permanency tests. Security printing materials and applications: Types of security inks-Security papers -MICR and NMICR, chemical reactive, uncoated, and toner fused papers. Security printing techniques Dry offset, offset, intaglio, flexography, gravure and hybrid printing.

References:

1. Martin Graham, *"Nonimpact Printing",* Pira International, United Kingdom, 1992.
2. Harald Johnson, *"Understanding Digital Printing",* Thomson Publishers, Boston, 2005.
3. Phil Green, *"Understanding Digital color"*, GATF and PIRA, USA, 1999.
4. AbhaySharma, *"Understanding Color Management",* Thomson Delmar Learning, USA, 2004.
5. Warner Richard D, Adams Richard M., *"Introduction to security printing",* PIA/GATF, Pittsburgh, 2005.
6. Narayanan R. *,"Computer Stationery and MICR Cheque Production"*, Association for research and development in printing, Madras,1988.

PMT 3103: COLOR ANALYSIS AND REPRODUCTION [4 0 0 4]

Visual system, structure and functioning of human eye, modern theory of light and color, Basic attributes of color, additive and subtractive synthesis and their practical interpretation. Munsell color system, device dependent and independent color systems, Principles of color management, Color management systems, Color management for display devices, Input devices and output devices, ICC profiles V2 and V4, Densitometer, colorimeter and spectrophotometer, screen angles and juxtaposition of dots, digital halftones, color correction, Press color control,factors in color printing, dot area measurement, Murray Davis equation and Yule Neilson correction, UCR and GCR, additivity and proportionality failure, Standard Charts, Electronic scanning, Neugebauer three color and four color equations, modified Neugebauer equation for scanner.

References:

1. Mark D. Fairchild, *"Color Appearance Models"*, John Wiley & Sons Ltd, England,2005.
2. Constance Sidles, Rick Sutherland and Barb Karg, *"Graphic Designer's Print & Color Handbook",* Rockport Publishers Inc, USA, 2005.
3. Gaurav Sharma, *"Digital Color Imaging Handbook",* CRC Press, USA,2003.
4. Lindsay W. MacDonald and M. Ronnier Luo, *"Color Image Science",* John Wiley & Sons Ltd, England,2002.
5. Asim Kumar Roy Choudhury, *"Modern Concept of Color and Appearance",* Oxford & IBH Publishing Co Pvt Ltd, New Delhi,2000.
6. Gary G. Field, *"Color and Its Reproduction"*, GATF Press Pittsburgh, USA,1999.

PMT 3104: SOUND ENGINEERING [4 0 0 4]

Fundamentals of sound, primary factors governing studio and control room acoustics, Ceilings, windows and doors, Noise isolation within the control room, Frequency balance, Power and grounding guidelines, Ergonomics, The sound chain Microphones and Loud Speakers, Acoustics, Disc recording, distortion and noise reduction, Stereo pickup techniques, Miking speech in radio, Miking speech for picture, Recording speech stereo recording systems, Optical recording, reproduction, amplifying systems, Processing of audio signal, Dubbing, Music mix down, Spatial manipulation of sound, Stereo multiplexing, Equalizers and Mixers, electronic music synthesizers, Theatre sound system, AM / FM tuners, audio system, Anatomy of Hi-Fi system.

References:

1. Stanlgy R Alten, *"Audio in Media"*, Wads Worth Publisher, Australia, 2005.
2. David Miles Huber and Robert E Runstein, *"Modern Recording Techniques"*, Elsevier, New Delhi, 2005.
3. S.P. Bali, *"Consumer Electronics"*, (1e), Pearson Education, India.2005.
4. Glen Ballou, *"Hand book for Sound Engineers"*, (4e), Elsevier Inc.,2008.
5. F. Alton Everest, Ken C. Pohlmann,"*Master Handbook of Acoustics*" (5e), McGraw-Hill Companies, Inc.2009.

PMT 3111: COLOR ANALYSIS AND REPRODUCTION LAB [0 0 3 1]

List of Experiments:

1. FM Hue Test
2. Impact of Illumination on color perception
3. Characterization of Monitor
4. Characterization of Scanner
5. Characterization of Projector
6. Measuring Hue error, Contrast & Grayness
7. Measurement of printed ink density and trapping (additivity failure)
8. Measuring Dot gain from CIELab values
9. Dot area measurement (Murray Davis equation & Yule Neilson correction)
10. Characterization of Printer
11. Effect of screen angles and dot shape on color (Lab readings)and comparing with standard
12. Gray Balance using G7

References:

1. Mark D. Fairchild, *"Color Appearance Models"*, John Wiley & Sons Ltd, England, 2005.
2. Constance Sidles, Rick Sutherland and Barb Karg, *"Graphic Designer's Print & Color Handbook*", Rockport Publishers Inc, USA, 2005.
3. Gaurav Sharma, *"Digital Color Imaging Handbook"*, CRC Press, USA, 2003.
4. Lindsay W. MacDonald and M. RonnierLuo, *"Color Image Science",* John Wiley & Sons Ltd, England, 2002.
5. Asim Kumar Roy Choudhury, *"Modern Concept of Color and Appearance",* Oxford & IBH Publishing Co Pvt Ltd, New Delhi, 2000.
6. Gary G. Field, *"Color and Its Reproduction"*, GATF Press Pittsburgh, USA,1999.

PMT 3112: PRINTING MACHINE LAB [0 0 6 2]

List of experiments:

1. Setting sheet control devices, inking and the dampening unit, Plate and blanket mounting and demounting
2. Single color printing and evaluating plate Vs print quality of single color print on coated and uncoated substrates.
3. Linearization of the image carrier
4. Four color printing and Print quality evaluation and profile generation for offset machine
5. Web feeding, tensioning and settings for single and both side printing and relative gear profile.
6. Plate mounting, Single color flexo printing and trouble shooting
7. Plate mounting ,Two color flexo printing and trouble shooting

8. Multicolor gravure printing and trouble shooting
9. Single color screen printing
10. Multicolor screen printing.
11. Halftone screen printing
12. Screen printing using semiautomatic machine
13. Press visit.

References:

1. Dejidas L.P. and Destree T. M, *"Sheet fed Offset Press Operating"*, PIA/GATF Press, Pittsburgh,2005.
2. GATF Staff, *"Solving Sheet fed Offset Press Problems"*, GATF, USA.1994.
3. Blair Ray and Destree T. M, *"Flexography - Principle and Practices"*, (5e), Foundation of Flexographic Technical Association, USA, 1999.
4. White Anthony, *"High Quality Flexography"*, PIRA, UK, 1992.
5. Ray Blair and Thomas M.D, *"Gravure Process and Technology",* GAA, USA.1991.
6. Samuel B.H, *"Screen Printing - Contemporary Approach"*, Delmar publisher, New York. 1997.

PMT 3113: SOUND ENGINEERING LAB [0 0 3 1]

List of experiments:

1. Setting up the sound Studio.
2. Determining the characteristics and frequencies using Mixer.
3. Characteristics of different types of Microphones (3 experiments)
4. Measurements of performance parameters of different types of speakers (4 experiments)
5. Experiments using DAW (Digital Audio Workstation) (3 experiments)

References:

1. Stanlgy R Alten, *"Audio in Media"*, Wads Worth Publisher, Australia, 2005.
2. David Miles Huber and Robert E Runstein, *"Modern Recording Techniques",* Elsevier, New Delhi. 2005.
3. S.P. Bali, *"Consumer Electronics"*, (1e), Pearson Education, India, 2005.
4. Glen Ballou, *"Hand book for Sound Engineers"*, (4e), Elsevier Inc., 2008.
5. F. Alton Everest, Ken C. Pohlmann, *"Master Handbook of Acoustics",* (5e), McGraw-Hill Companies, Inc.,2009.

SIXTH SEMESTER

HUM 4001: ESSENTIALS OF MANAGEMENT [2 1 0 3]

Definition of management and systems approach, Nature & scope, The functions of managers, Corporate social responsibility. Planning: Types of plans, Steps in planning, Process of MBO, How to set objectives, Strategies, Policies & planning premises, Strategic planning process and tools. Nature & purpose of organising, Span of management, factors determining the span, Basic departmentalization, Line & staff concepts, Functional authority, Art of delegation, Decentralisation of authority. HR planning, Recruitment, Development and training.Theories of motivation, Special motivational techniques. Leadership - leadership behaviour & styles, Managerial grid. Basic Control Process, Critical Control Points & Standards, Budgets, Non-budgetary control devices.Profit & loss control, Control through ROI, Direct, Preventive control. Managerial practices in Japan & USA & application of Theory Z. The nature & purpose of international business & multinational corporations, unified global theory of management. Entrepreneurial traits, Creativity, Innovation management, Market analysis, Business plan concepts, Development of financial projections

References:

1. Koontz D. *"Essentials of Management",* Mc Graw Hill, New York, 2004
2. Peter Drucker, *"Management, Task and Responsibility",* Allied Publishers, 2006
3. Peter Drucker, *"The practice of management",* Butterworth Hein Mann, 2003

PMT 3201: PRINT FINISHING AND CONVERTING [4 0 0 4]

Binding Classifications.Planning impositions, Binding tools and equipment, Book Binders Materials. Paper sizes Types, advantages and applications, Adhesives - Principles, theory, types. Processing of hardbound book - Physical parts of hardbound books, Machine folding - principles, machines, Tipping-in / attachment of plates. End papers-purposes, kinds. Steps in processing hardbound books, Modern guillotines, Covering Types of covers, Covering styles. Publishers case binding Operations and machines, On demand booklet binding, Securing Methods: Wire stitching - saddle stitching, side stitching, wire stitching machine, French, tape, cord and whip sewing. Adhesive binding, adhesive binding glue options- EVA, PVA and PUR Binding, testing methods.Perfect binding Process, Principles & Types. Lay-flat adhesive binding - Types, Construction and technical considerations. Mechanical binding - spiral, Wire 'o', post binders, ring metal and plastic comb binding, Finishing and Converting Processes - Edge decoration, Numbering, Indexing. Ruling, Mailing, Easy-Release and Seam glue, Re-moistenable glue, Quality control in print finishing & converting. Cover decoration, Print finishing operations, Film lamination, UV and press applied coatings, Modernization in Print finishing & converting - Advancements in post-press, Quality control in print finishing & converting.

References:

1. Tedesco T.J, *"Binding, Finishing and Mailing"*, GATF, USA, 2005.
2. Lyman Ralph, *"Binding and Finishing"*, GATF, USA,2000.
3. Speirs Hugh, *"Introduction to Printing and Finishing"*, PIRA, UK,1998.
4. Mendiratta B.D, *"Printers Costing and Estimating"*, Print Trade Publications, New Delhi,1999.
5. *Speirs Hugh M, "Print Estimators The Hand Book"*, BPIF, London, 1996.

PMT 3202: VIDEO PROCESSING [4 0 0 4]

Introduction to color video processing. Digitization and manipulation of images, Histogram equalization and compression. Categorization of video coding schemes, Information Theory for source coding, Video encoding, content dependent video coding, Object based video coding and Knowledge based video coding, Semantic video coding, Layered coding system. Stereo and multi view sequence processing and stereo sequence coding. Error control in video communications and error resilience Tools, Overview of approaches. Streaming of video over the internet and wireless networks, Streaming servers, Media synchronization, Protocols for streaming video, Streaming video over wireless IP networks.

References:

1. Vasuki Belavadi, *"Video Production",* Oxford University Press, New Delhi, 2013.
2. Yao Wang, Jorn Ostermann, Ya-Qin Zhang, *"Video Processing and*

Communications", Prentice Hall, 2002.
3. Alan C. Bovik, *"The Essential Guide to Video Processing"*,(2e), Elsevier Science, 2009.
4. Murat Tekalp, *"Digital Video Processing"*, (1e), Prentice Hall,1996.
5. Steven E Browne, *"Video Editing: A Post Production Primer*," Focal Press, Oxford, 1997.

PMT 3211: PRINT FINISHING AND CONVERTING LAB [0 0 3 1]

List of experiments:

1. French Sewing - Preparation of French sewn quarter bound hard case book.
2. Chord Sewing - Preparation of Chord sewn quarter bound hard case book.
3. Tape Sewing - Preparation of Tape sewn full bound hard case book.
4. Preparing books by Sewing two sections on method. Preparation of following type of Mechanical binding - Spiral wire binding, Wire 'O' binding,
5. Preparation of End papers - Single End paper, Double or Inserted End paper, Made end paper, Cloth joint end paper, Zig-Zag end paper, Cloth joint Zig-Zag end paper.
6. Preparation of Receipt books with numbers in duplicate and triplicate.
7. Preparation of telephone directory with Indexes and Tabs.
8. Edge decoration of hard case book and attachment of head bands, tail bands and marker.
9. Center Sewing, Side Sewing, Center Stitching of books. Securing methods using machine.
10. Carrying out Special effect Print Finishing operations Embossing, Gold blocking, Thermography.
11. Preparation of files of following designs - Loose leaf file - single piece, Loose leaf file - Two piece tab binder, Loose leaf guard file - Boards joined with spine strip, Court case file, Portfolio - Closed file to keep confidential loose sheets.
12. Film Laminating: Thermal/ cold lamination. Preparation of pouch laminated samples.

References:

1. Tedesco T.J, *"Binding, Finishing and Mailing"*, GATF, USA, 2005.
2. Lyman Ralph, *"Binding and Finishing"*, GATF, USA,2000.
3. Speirs Hugh, *"Introduction to Printing and Finishing"*, PIRA, UK,1998.
4. Mendiratta B.D, *"Printers Costing and Estimating",* Print Trade Publications, New Delhi, 1999.
5. Speirs Hugh M, *"Print Estimators The Hand Book",* BPIF, London,1996.

PMT 3212: VIDEO PROCESSING LAB [0 0 3 1]

List of experiments:

1. Image generation, editing and enhancement
2. Audio and Video recording and editing
3. Audio and video Mastering
4. Video encoding.

References:

1. VasukiBelavadi, *"Video Production",* Oxford University Press, New Delhi, 2013.
2. Yao Wang, Jorn Ostermann, Ya-Qin Zhang, *"Video Processing and Communications",* Prentice Hall, 2002.
3. Alan C. Bovik, *"The Essential Guide to Video Processing",* (2e), Elsevier Science, 2009.
4. Murat Tekalp, *"Digital Video Processing"*, (1e), Prentice Hall, 1996.
5. Steven E Browne, *"Video Editing: A Post Production Primer"*, Focal Press, Oxford, 1997.

SEVENTH SEMESTER

HUM 4002: ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT [2 1 0 3]

Nature and significance, Micro & macro differences, Law of demand and supply, Elasticity & equilibrium of demand & supply. Time value of money, Interest factors for discrete compounding, Nominal & effective interest rates, Present and future worth of single, Uniform gradient cash flow. Bases for comparison of alternatives, Present worth amount, Capitalized equivalent amount, Annual equivalent amount, Future worth amount, Capital recovery with return, Rate of return method, Incremental approach for economic analysis of alternatives, Replacement analysis. Break even analysis for single product and multi product firms, Break even analysis for evaluation of investment alternatives. Physical & functional depreciation, Straight line depreciation, Declining balance method of depreciation, Sum-of-the-years digits method of depreciation, Sinking fund and service output methods, Costing and its types Job costing and Process costing, Introduction to balance sheet and profit & loss statement. Ratio analysis - Financial ratios such as liquidity ratios, Leverage ratios, Turn over ratios, and profitability ratios

References:

1. Blank Leland T. Tarquin Anthony J., *"Engineering Economy*", McGraw Hill, New Delhi, 2002.
2. Chan S. Park, *"Contemporary Engineering Economics*", Pearson Education, Inc, 2010.
3. Raman B.S., "*Advanced accountancy*", United publications, Bangalore, 1993
4. T. Ramachandran, "*Accounting and Financial Management"*, Scitech Publications Pvt. Ltd. India, 2001.
5. Thuesen G. J &Thuesen H. G., *"Engineering Economics",* Prentice Hall of India, New Delhi, 2005

PMT 4101: PACKAGING DESIGN AND TESTING [3 0 0 3]

Elements of package design: factors influencing design of a package, computer aided package design, Packaging cycle, product package relationship, product life curve, Hazards on package, Markings on package. Tests on package - mechanical, climatic. Corrosion - types, cause, corrosion prevention methods. Desiccants types, properties and applications, Cushioning materials - functions, properties. Classifications, Cushion Design - Design procedure, cushion curve. Paper & paper board packaging: Types and applications, corrugated board construction, box design variations and dimensioning, decorating the corrugated box, properties and tests, Calculation of corrugated board combination and stacking strength of corrugated box. Glass containers: types and properties, glass and bottle manufacture, bottle design features, labeling and decorating, design considerations. Metal cans and containers: Metal container shapes, can making steels, types of metal cans, methods of making two piece drawn cans, Aerosols typical aerosol system, aerosol valve operation, Shaping plastics: Extrusion sheet extrusion, blown film extrusion and coextrusion, injection molding, combined forming methods, thermoforming principle, applications and molding methods, compression molding, transfer molding, Vacuum forming, Pressure Matched mold forming.

References:

1. Sudhir Gupta, *"Handbook of Packaging Technology",* Engineers India Research Institute, New Delhi, 2005.
2. Brody Aaron L, *"The Wiley Encyclopedia of Packaging Technology"*, John Wiley & Sons, Inc. New York, 1997.
3. Hanlon Joseph F, *"Handbook of Package Engineering"*, CRC Press, USA, 1998.
4. Briston John, *"Advances in Plastic Packaging Technology"*, PIRA, UK, 1992.
5. Natarajan S, *"Fundamentals of packaging technology"*, PHI, New Delhi, 2009.

PMT 4102: MEDIA PRODUCTION [2 0 6 4]

Visual language, basics of audio and visual media. Video camera and support systems Working of a Video camera, Camera features and their effects. Pre-production, production and post-production, Structure and functioning of a studio. Script writing. Lighting, properties, light planning and light sources. Sound properties, types of programme sound and sound effects. Microphones and audio recording. Editing theories and modes, Principles of editing-Matching actions. Providing special effects. Multi-media production embedding videos/images and using social media. Video and Broadcast Technology, Analog and digital technology, broadcast standards and transmission technologies.

References:

1. Vasuki Belavadi, *"Video Production"*, Oxford University Press, New Delhi, 2013.
2. Robert Mcleish, *"Radio Production"*, Focal Press, Oxford,1994.
3. Gerald Millerson, *"Video Production Handbook"*, Focal Press oxford, 1992.
4. Nick Dimbleby Richard, Dimble by Ken and Whrittington, *"Practical Media: A Guide to Production Techniques"*, Hodder and Stoughton, London, 1994.
5. Steve R Cartwright, *"Pre Production Planning For Video Film and Multimedia",* Focal Press, Oxford, 1996.
6. Gorham Kindemrobert B Musburger, *"Introduction to Media Production: From Analog to Digital",* Focal Press Boston,2001.

PMT 4103: ANIMATION TECHNOLOGY [3 1 0 4]

2D Animation: Introduction, Perception, The Heritage of Animation, Animation Production, Computer Animation Production, A Brief History of Computer Animation Computer Animation: Conventional and Computer-Assisted Animation, Design of Animation Sequences, Computer Animation Languages, Methods of Controlling Animation, Basic Rules of Animation, Problems Peculiar to Animation Technical Background: The Display Pipeline, Homogeneous Coordinates and the Transformation Matrix, Compounding Transformations: Multiplying Transformation Matrices Basic Transformations, Representing an Arbitrary Orientation, Extracting Transformations from a Matrix, Description of Transformations in the Display Pipeline, Round-off Error Considerations, Orientation Interpolation and Basic Techniques: The Appropriate Function, Controlling the Motion Along a Curve, Interpolation of Rotations Represented by Quaternions, Path Following, Key frame Systems Principles of Animation, 2D Animation overview, 2D Animation Basics, 2D Vector Animation. Animation Visual Effects and Technology in Context, Creative Development and the Digital Process, Modeling Concepts, Modeling Techniques, Advanced Modeling and Rigging Techniques, Rendering Concepts, the Camera. Shading and Surface Characteristics, Principles of Animation, Computer Animation Techniques, Advanced Computer Animation Techniques, Retouching, Compositing, and Color Grading.

References:

1. Foley J. D., Van Dam A., Feiner S. K., Hughes J. F., "*Computer Graphics*, *Principles and Practice",* (2e), Addision-Wesley
2. Donald Hearn, Pauline Baker M., *"Computer Graphics-C Version"*, (2e), Pearson Education.
3. Rick Parent, *"Computer Animation algorithms and techniques",* Academic Press, 2012.
4. Tony White, *"Animation From Pencils to Pixels"*, Elsevier Focal Press, 2006.
5. Isaac Kerlow, *"The Art of 3D Computer Animation and Effects".*
6. Jason van Gumster, *"Blender for Dummies",* Wiley Publishing.

PME 4111: PACKAGING DESIGN AND TESTING LAB [0 0 3 1]

List of Experiments:

1. Designing Straight Tuck End (STE) and Reverse Tuck End (RTE) style cartons.
2. Designing Full Seal End (FSE), Tray and Tube style cartons.
3. Die Cutting machine.
4. Compression Strength of various cartons using Mini Carton Compression tester.
5. Abrasion resistance of ink on various packaging paper and board materials using Ink Rub Tester.
6. Designing and preparation of various types of paper bags.
7. Evaluating the resistance offered by package against rough handling by using Drop Tester.
8. Measurement of ECT and RCT of and Predicting Stacking Strength of corrugated box using McKee formula.
9. Delaminating or Peel Strength of packaging Paper/board.
10. Co-efficient of friction of various flexible packaging materials.
11. Working with Package Designing Software.
12. Concepts and tools in 3D using package designing software.

References:

1. Brody Aaron L., *"The Wiley Encyclopedia of Packaging Technology"*, John Wiley & Sons, Inc. New York,1997.
2. Hanlon Joseph F, *"Handbook of Package Engineering"*, CRC Press, USA, 1998.
3. Prakash Shetty, *"Science and Technology of Printing Materials"*, MJP Publishers, Chennai, 2008.
4. BristonJohn, *"Advances in Plastic Packaging Technology"*, PIRA, UK, 1992.
5. Chakravarty B, *"A Hand Book for Printing and Packaging Technology"*, Galgotia Publications, 1997.
6. David Jairus R D, *"Aseptic processing and packaging of food"*, CRC Press, New York, 1996.

PMT 4112: ANIMATION TECHNOLOGY LAB [0 0 3 1]

List of Experiments:

1. To draw simple pendulum and animate.
2. To draw the ball and animate the bouncing ball.
3. To draw butterfly or kite and animate.
4. Create the scene (includes hills, house, sun, trees, river, boat and man) and apply the appropriate color to each object in the scene.
5. To Work with the 3D software Interface (Use BLENDER/3Ds MAX/Light Wave/MAYA), working with Viewports (windows) and Creating and Editing Objects.
6. To apply the concepts of Lighting and Cameras on 3D object.
7. To apply the concepts of Materials and Textures on 3D object.
8. Setting Up a World, Render Window Settings and Retracing (mirror, transparency, shadows)

9. To apply the concepts of Lighting and Shadows Reflection (mirror) and Refraction (transparency) on 3D object
10. To draw 3D object and animate.
11. To draw the 3D object using NURBS and Meta Shape.
12. To apply Modifiers on 3D object.

References:

1. Jason van Gumster, *"Blender for Dummies"*, Wiley Publishing.
2. Todd Perkins, *"Flash Game Creator Guide"*, MGH Publications.
3. Rick Parent, *"Animation algorithms and techniques"*, Academic Press, 2012.
4. Tony White, *"Animation from Pencils to Pixels"*, Elsevier Focal Press, 2006.
5. Isaac Kerlow, *"The Art of 3D Computer Animation and Effects".*

EIGHTH SEMESTER

PMT 4297: SEMINAR

- Each student has to present a seminar individually, on any technical topic of current interest / latest advancement / topics not covered in the syllabus.
- The topic has to be approved by the Department and a report of the same has to be submitted a week before the day of the presentation.

PMT 4298: INDUSTRIAL TRAINING

- Each student has to undergo industrial training for a minimum period of 4 weeks. This may be taken in a phased manner during the vacation starting from the end of third semester.
- Student has to submit to the department a training report in the prescribed format and also make a presentation of the same. The report should include the certificates issued by the industry.

PMT 4299: PROJECT WORK / PRACTICE SCHOOL

- The project work may be carried out in the institution/industry/ research laboratory or any other competent institutions.
- The duration of the project work shall be a minimum of 16 weeks which may be extended up to 24 weeks.
- A mid-semester evaluation of the project work shall be done after about 8 weeks.
- An interim project report on the progress of the work shall be submitted to the department during the mid-semester evaluation.
- The final evaluation and viva-voice will be conducted after submission of the final project report in the prescribed form.
- Student has to make a presentation on the work carried out, before the department committee as part of project evaluation.

MINOR SPECIALIZATIONS

I. PACKAGING TECHNOLOGY

PMT 4001: PACKAGING APPLICATIONS [3 0 0 3]

Food packaging: MAP and CAP - Introduction, principles, gases used in MAP, packaging of flesh foods, packaging of horticultural products, packaging of dairy products, packaging of beverages, legislative and safety aspects of food packaging. Packaging of cosmetics: Factors effecting shelf life, Cosmetic packaging Plastics used in cosmetic, Aerosol packaging. Packaging of fertilizers and pesticides: Packaging materials, Factors governing selection, types. Recent developments. Packaging of pharmaceuticals: Types, materials used and properties, surface treatments, blister, strip and sachet packaging, printing and decorating. Packaging of Hazardous Chemicals: Requisites for packaging materials, Common packages for hazardous chemicals textile bags, paper bags, metal containers, glass containers, paper board/fibre board containers, plastic containers.

References:

1. Gordon L. Robertson, *"Food Packaging: Principles and Practices"*, Marcel Dekker, Inc, New York, USA, May 2008.
2. Brody Aaron L, *"The Wiley Encyclopedia of Packaging Technology",* John Wiley & Sons, Inc. New York,1997.
3. Hanlon Joseph F, *"Handbook of Package Engineering"*, CRC Press, USA,1998.
4. David Jairus R D, *"Aseptic processing and packaging of food",* CRC Press, New York1996.
5. Natarajan S, *"Fundamentals of packaging technology",* PHI, New Delhi, 2009.
6. Edward J Bauer, *"Pharmaceutical Packaging Hand Book",* Informa Healthcare USA, Inc. New York, 2009.

PMT 4002: PACKAGING MATERIALS [3 0 0 3]

Paper board manufacture, characterization & types, surface treatments & coatings, Wood classification, defects, wood treatment methods. Glass production, properties and types. Metals types, functional properties. Plastics -packaging polymers epoxies, PC, EVAL, PVAL, SAN, additives, applications, properties tensile, tear strength, impact strength, heat seal strength, coefficient of friction, haze and gloss, environmental stress crack resistance (ESCR), chemical properties, molding processes. Adhesives and adhesive tapes - types, properties and applications. Cushioning materials - functions, selection, properties and classifications. Expanded polystyrene-process of manufacturing, advantages and applications. Thermoplastic foam processing. Flexible packaging laminates: Purpose, properties of laminates structural, performance, barrier, aesthetics and other properties. Laminating processes wet bonding, dry bonding, hot-melt bonding. Specifying laminates, advantages of laminates.

References:

1. Brody Aaron L, *"The Wiley Encyclopedia of Packaging Technology",* John Wiley & Sons, Inc. New York, 1997.
2. Richard Gendron, *"Thermoplastic Foam Processing Principles and Development",* CRC Press, Florida, 2005.
3. Athalye A.S, *"Plastics in Packaging"*, Tata McGraw-Hill, New Delhi, 1992.
4. BristonJohn, *"Advances in Plastic Packaging Technology"*, PIRA, UK, 1992.
5. Natarajan S, *"Fundamentals of packaging technology"*, PHI, New Delhi, 2009.

PMT 4003: PACKAGING TECHNIQUES AND PROCESSES [3 0 0 3]

Packaging materials, Container types, Specialty Packaging, Machinery for manufacture of glass, metals, composites, sacks, paper boards, flexible plastics, Skin, Blister, Shrink packaging. Stretch wrapping, Strip packaging. Lamination, Hot foil stamping, Die-cutting, Varnishing, Coatings, Labels, Caps and seals, Security in packaging - Need, Materials, Techniques. Containers and Closures, Screw, lug, friction, roll-on, snap-on, Closure Seals, Standard Closures - Plastic, Metal; Child-Resistant Caps & Closures; Dispensing closures, Paper, Foil & Laminated Lids, Top seal, Induction seal, wads & wading systems. Packaging Machines for line operations & systems Machines for filling, seal wrapping machine, Thermoform-fill-seal machine - VFFS, HFFS, Bottling machines, Induction sealing, Coding, Capping, Marking, stapling, stenciling, seaming, Labelling, online & offline inspection

equipment, Other ancillary equipment tube/bag sealing, slitting, winding, taping and strapping.

References:

1. Walter Soroka, *"Fundamentals of packaging technology"*, (3e), Institute of packaging professionals, Naperville, Illinois, USA,2002.
2. Joseph F. Hanlon, Robert J. Kelsey, and Hallie Forcinio, *"Handbook of Package Engineering",* (3e), CRC press, 1998.
3. Davis, C.G., *"Introduction to Packaging Machinery"*, Packaging Machinery Manufacturers Institute. 1997.
4. Otto G. Piringer, A. L. Baner, *"Plastic Packaging: Interactions with Food and Pharmaceuticals",* (2e), Wiley-VCH, 2008.
5. A. L. Brody, K. S. Marsh, *"The Wiley Encyclopedia of Packaging Technology",* (2e), Wiley, New York, USA.1995.

PMT 4004: SMART PACKAGING [3 0 0 3]

Indicators and Sensors Integrity indicators, Time-Temperature indicators, freshness indicators. Oxygen sensors, gas sensors, bio sensors.Automatic Identification Systems: Barcodes, Card Technologies, Smart Cards, Magnetic Cards, Optical Cards, Radio-Frequency Identification (RFID) authentication and tracking technologies for packaging, Laser surface Authentication, Hologram, security features, security inks, labels thermochromic labels. Smart Packaging for Food Products - Non-Meat Food Products (Bakery products, Fruits and Vegetables, Dairy products) - Oxygen Scavengers, Ethylene Scavengers, Ethanol Emitters Enzymatically active packages, and other technologies. Meat and Poultry Products - Oxygen Scavengers, Carbon Dioxide Scavengers/Emitters, Moisture control, Antimicrobial Packaging, Freshness and Temperature Control. Fish and Seafood Products -Mechanisms of Fish Spoilage, On-pack Quality Indicators, Time Temperature Integrators., Food Quality Indicators, Modified Atmosphere Packaging (MAP).Fruits and vegetables - time temperature indicators, gas and volatiles indicators, RFID, Modified atmosphere packaging (MAP). Legislative Issues- Legislation relevant to smart packaging, authorization procedure, general safety, labelling, Regulation of new forms of food packaging produced using nanotechnology.

References:

1. Ohkubo, M. et al, *"RFID Privacy Issues and Technical Challenges"*, Communications of the ACM, Vol. 48, No. 9,2005.
2. Garfinkel, S., et al., *"RFID Privacy: An Overview of Problems and Proposed Solutions",* Los Alamitos, CA: IEEE Computer Society,2005.
3. NanoMarkets LC, *"Printable Electronics: Roadmaps, Markets and Opportunities",* Executive Summary, 2005.
4. Sipilä, M., *"Communications Technologies",* The VTT Roadmaps, Helsinki, Finland: VTT Research Notes 2146, ESPOO, 2002.
5. Charles L. Wilson, *"Intelligent and active packaging for fruits and Vegetables"*, CRC press, USA,2007.
6. Joseph Kerry& Paul Butler, *"Smart Packaging Technologies for Fast Moving Consumer goods",* John Wiley & Sons, Ltd, UK,2008.

II. BUSINESS MANAGEMENT

HUM 4011: FINANCIAL MANAGEMENT [2 1 0 3]

Introduction to financial management, Principle of accountancy, Sources of long term finance, Valuation of securities, Leverages, Working capital management, Capital budgeting, Cost of capital, Cash management, and Dividend decisions.

References:

1. Prasanna Chandra, *"Fundamentals of Financial Management",* Tata McGraw Hill, Delhi, 2006.
2. I M Pandey, *"Financial Management",* Vikas Publishing house, Delhi, 2007.
3. Subir Kumar Banerjee, *"Financial Management",* Sultan Chand & Co., Delhi, 1999.
4. ICFAI, *"Corporate Financial Management"*, ICFAI, Hyderabad, 2003.
5. Maheshwari S.N, *"Financial Management",* Sultan Chand & Co., Delhi, 2002.

HUM 4012: HUMAN RESOURCE MANAGEMENT [2 1 0 3]

Evolution and development, HRD Organization and responsibilities. Evolution of HRM, Theories of HRM. Human resource planning, Human Resources Inventory, Forecast, Job analysis, Job description, Job specification, Job evaluation, Employment stability. Human Resource Planning and Recruiting, Induction, & socialization, Training and development, Performance management and appraisal.

References:

1. T.V. Rao and Pereira D F, *"Recent experiences in Human Resources Development"*, Oxford and IBH Publishing, 1986.
2. Subbrao A, *"Essentials of Human Resource Management and industrial Relations",* Himalaya Publishing House, 1999.
3. N G Nair and Latha Nair, *"Personnel Management and Industrial Relations",* S. Chand Company, 1995.
4. Virmani B R; Rao Kala, *"Economic restructuring technology transfer and human resource development"*, Response books, 1997.
5. PareekUdai et al., *"Human Resource Development in Asia: Trends and Challenges"*, Oxford and IBH Publishing, 2002.

HUM 4013: MARKETING MANAGEMENT [2 1 0 3]

Understanding marketing management, Assessing market opportunities and customer value, Adapting marketing to the New Economy, Building Customer Satisfaction, Value, and Retention, Market Demand, Scanning the Marketing Environment, Consumer Markets, Business Markets, Dealing with the Competition, Market Segments, Product Life Cycle, New Market Offerings, Designing and Managing Services, Price Strategies, Retailing, Wholesaling, Integrated Marketing Communications.

References:

1. Philip Kotler, *"Marketing Management Analysis, Planning, Implementation and Control",* Prentice Hall of India Private Limited, New Delhi, 2000.
2. ICFAI, *"Marketing Management",* ICFAI, Hyderabad, 2003.
3. Varshney R L and Gupta S L, *"Marketing Management"*, Sultan Chand & Sons, New Delhi, 2004.
4. Adrian Palmer, *"Principles of Marketing"*, Oxford University Press, New York, 2000.

HUM 4014: OPERATIONS AND SYSTEMS MANAGEMENT [2 1 0 3]

Types of production activities, Production consumption cycle, Functions of production and operations management, Importance and uses of forecasting, Product development and design: Product life cycle, Process design, Process charts, Flow diagrams and Man machine charts, Capacity planning, Aggregate planning, Scheduling, Operations strategy, Operation performance Frontier and productivity, Systems thinking, Systems engineering and its management, Systems decision process. Systems thinking, structure, classification, boundaries,

visibility, System life cycle models, System dynamics and its importance in system thinking. System dynamics modeling process.

References:

1. Monks Joseph G, *"Operations Management",* Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2004.
2. Krajewski Lee J. and Ritzman Larry P, *"Operations Management",* Pearson Education (Singapore) Pte. Ltd., Delhi, 2005.
3. Mieghem J, *"Operations Strategy: Principles and Practices, Dynamic Ideas",* ISBN: 0-9759146-6-9, 2008.
4. Sterman J D, *"Business Dynamics - Systems Thinking and Modeling for a Complex World",* McGraw Hill, International Edition, 2004.
5. Senge Peter, *"The Fifth Discipline"*, Currency Doubleday, New York, 1990.

OTHER PROGRAMME ELECTIVES

PMT 4005: ADVERTISING THEORY AND PRACTICE [3 0 0 3]

Advertising in India, socio-economic effects, advertising as a tool of communication, Need for advertising, Functions of advertising, Benefits of advertising: To Seller, Buyer & Media, role of advertising in the marketing mix, Negative and Positive effect of advertising, Kinds of advertising. Advertising Agency, structure & types of advertising agencies, agency selection criteria's, agency accreditation and client turn-over, compensations for agencies. creativity in advertising, appeals & execution styles, planning & development, creative process & tactics, media planning, market analysis, implementation, evaluation and follow-up.Overview of media- television networks, magazines, newspapers, radio, selection and buying media time & space, Support media internet, interactive media, out-door, in-store, direct mail, miscellaneous and transit advertising, advertising campaign, corporate advertising. Advertising Ethics first amendment of advertising, National Advertising Review Council (NARC), regulations for advertisers, agencies, and media. Case studies.

References:

1. Jethwaney Jaishri and Jain Shruthi, *"Advertising Management"*, OUP, ND,2006.
2. George E. Belch and Michael A. Belch, *"Adverting and Promotion"*, Tata McGraw- Hill Publishing Company Limited, New Delhi, 2005.
3. Surmanek Jim, *"Advertising media A to Z"*, Tata McGraw-Hill Publishing Company Limited, New Delhi,2004.
4. Wells William,*" Advertising",* Prentice hall, New Delhi,2002.
5. Jefkins Frank and Yadin Daniel, *"Advertising"*, Prentice hall, New Jersey, 2000.
6. Chunawalla S.A. and Sethia K.C, *"Foundations of advertising theory and practice",* Himalaya Publishing House, Mumbai.2000.

PMT 4006: COMMUNICATION SYSTEMS [3 0 0 3]

Introduction to Electronic Communication, Digital modulation principles and types. Satellite communication systems, Introduction to Satellite communication. Basic transmission theory and problems, Application of Satellites. Wireless communication systems, Concept of cellular mobile communication-frequency reuse, Operation of Cellular systems. Multiple access systems. GSM architecture. Mobile radio propagation Free space propagation model. Antenna & wave propagation, Optical communication systems. Concept of cylindrical waveguide, Modes in optical fibers. Attenuation and dispersion in optical fibers, Optical sources and detectors, Optical communication system examples.

References:

1. Dennis Roddy and John Coolen, "*Electronic Communications"*, (4e), Prentice Hall of India, 1997.
2. George Kennedy, **"***Electronic communication system"*, Prentice Hall of India (P) Ltd., New Delhi, 1999.
3. Gerd Keiser, *"Optical Fiber Communication"*, McGraw Hill,1991.
4. Timothy Pratt, *"Satellite communication systems"*, John Wiley and Sons, 2006.
5. William Stallings, *"Wireless Communication and networks"*, Pearson Education, 2006.

PMT 4007: CONTINUOUS STATIONERY AND SPECIALTY PRINTING [3 0 0 3]

Continuous stationery forms and application: Integrated cards, affixed cards, PIN mailers, OMR sheets, cheques, coupons, Multi part mailer and flyers and Envelopes. Materials for Continuous stationery forms: Paper maplitho, art, MICR grade, sticker, coated, carbon less, thermal. Designing, Printing and finishing process for Continuous stationery forms: Machine configurations Job make ready. Finishing operations & variable data printing. Specialty Printing processes Work flow, Machineries, construction, substrate requirements, substrate treatments, designing software, quality controlling aids. Specialty inks and printing requirements: UV, water based, polymer, metallic, nano, thermo setting inks. Special finishing effects, quality, control requirements and products: Special effect printing process. Finishing operations and quality control methods.

References:

1. EIRI Board of Consultants and Engineers, *"Hand Book of Printing Technology",* Engineers India Research Institute, New Delhi.
2. Narayanan R., *"Computer Stationery and MICR Cheque Production"*, Association for research and development in printing, Madras,1988.
3. RainesG, *"Forms for the 80's - How to Design and Produce Them"*, North American Publishing Co, USA,1980.
4. Warner Richard D; Adams Richard M, *"Introduction to security printing"*, PIA/GATF, Pittsburgh, 2005.

PMT 4008: DIGITAL PHOTOGRAPHY [3 0 0 3]

Lighting for Media, Selection of light sources, Luminaire for media applications, Photographic layout and workflow, Working principle & construction of photographic cameras, types of cameras, accessories & their functions, geometry & photometry of image formation, advantages of digital photography, B/W Photography, Photographic Optics, Digital workflow, Digital image processing & manipulations, photography for professionals, Photographic materials and output, Choosing Lenses, Alternative image sensor technologies, lighting control, Tone control, RAW editing and conversion, Digital image corrections, reproduction and archiving, Digital File management, Color in photography, Photography tips & tricks, Tackling photographic subjects people, animals, sports, nature, landscapes, and travel destinations, Colour and black & white photography, Cinematography and Video Photography.

References:

1. Ken Milburn, *"Digital Photography: Expert Techniques"*, O'Reilly, USA,2006.
2. David D. Busch, *"Mastering Digital Photography",* Course Technology, USA,2006.
3. Joseph Claglia, et al., *"Absolute Beginner's Guide to Digital Photography",* Que publishing, USA,2004.

4. Dan Simon, *"Digital Photography Bible"*, Wiley Publishing, USA,2004.
5. Ralph E Jacobson, et al., *"The Manual of Photography Photographic & Digital imaging"*, Focal Press, USA,2000.

PMT 4009: E-PUBLISHING [3 0 0 3]

Publishing & Publication Media: Publishing Process, Standards, Publishers' and Metadata. Offline, Online and hybrid publication Media. Content and content formats: types, text, formats. E-publishing Models. The e-book: E-book content, delivery formats, components, producing e-books, e-books and metadata, e-books and encryption, managing e-book content. Digital Library: Scope, Uses, Challenges, Features, Formats. Digital Asset Management: Systems, Functionality, Infrastructure, Types, and Benefits. Document Management System: Capture, Indexing & Retrieval, Annotations, Storage and Archival, Distribution and workflow. Digital Rights Management: Aim, Need, Legal requirements, Approach, Challenges, Limitations, Applications, Process. Intellectual Property Rights and Copyrights: Issues, Contracts, Challenges and applications. E-publishing formats: HTML, SGML, XML, PDF and Latex. Media Law and Ethics: Constitution of India, Press laws in India, Prasar Bharti Act, defamation in media, Information Technology & Convergence bill, Features of Cable Television Act, Media and Public Interest Litigation, Obscene Publications Act, Data Protection Act, Entertainment Law, Trade-mark Act and Patent Act, Media and Social Responsibility.

References:

1. Carina Rogobete, Georg Peters and Jan Seruga, *"Cross Media and E-Publishing"*, International Journal of u- and e- Service, Science and Technology Vol. 5, No. 2, 2012.
2. *"Electronic Publishing: Impact of ICT on Academic Libraries",* ArchanaSaxena, ICAL, 2009.
3. Document Management Overview, *"Document Imaging in the new millennium"*, Compulink Management Center, Inc. 2007.
4. *"Intellectual Property Rights Issues of Digital Publishing - Presence and Perspectives"*, Hamburg University, Script-ed, Volume 2, Issue 2, 2005.
5. *"Digital Asset Management A Closer Look at the Literature"*, A Research Monograph of the Printing Industry Center at RIT, 2005.
6. Wayne Overbeck and Genelle Belmas, *"Major Principles of Media Law"*, Wadsworth - Cengage Learning, USA,2010.

PMT 4010: GREEN PRINTING [3 0 0 3]

Overview, requirements.Printing wastes - characteristics, types, life cycle of waste, pre-press, press and post-press wastes, specific wastes from different printing processes.Waste segregation, recycling and reuse.Alternative materials - paper, ink, solvents, adhesives and other materials.Process Modifications, Digital Proocesses, Material Handling and storage, Pollution Prevention and Cleaner Production. Environmental Management System - accounting concepts, data collection, evaluation and process operations, ISO 14000 and Life-cycle concepts.

References:

1. Kipphan Helmut, *"Handbook of Print Media",* Springer, Germany,2001.
2. Jones Gary A, *"Air Pollution Engineering Guide for Graphic Arts Industry"*, GATF,1993.
3. F.F.T.A, *Flexography: "Principles and Practices"*, Foundation of Flexographic Technical Association Inc., USA,1999.
4. John Geis A and Paul Addy L, *"Materials Handling for the Printer",* GATF Press, Pittsburgh,1999.
5. Kenneth Mulholland L and James Dyer, *"Pollution Prevention: Methodology, Technologies and Practices"*, American Institute of Chemical Engineers, New York,1999.
6. JuergenBaro, et al., *"UV Technology: A practical guide for all Printing Processes"*, BG, Wiesbaden, 2008.

PMT 4011: MEDIA ACCOUNTING AND MANAGEMENT [3 0 0 3]

Financial accounting - Overview. Meaning, definition objective, scope and advantages of Book keeping and Accounting. Journal, Ledger and Trial Balance. Cost accounting - Nature and Scope of cost accounting, Advantages of cost accounting to management. Cost analysis and classification. Direct expenses. Factory Overheads. Office, Administration, Sellling and Distribution OH. Single or Output or Unit Costing.Job and Batch Costing. Management accounting - Nature, Objectives and Scope of Management Accounting. Financial statement.Ratio analysis. Dupont Chart. Fund flow statement. Human resource management for printing industry, print marketing and sales, role and scope of the printing manager and managing changes. Estimating - Ink, paper and binding materials used in printing industry. Pricing Media Properties for Sponsorships and Programming.

References:

1. M E Thukaram, *"Accounting for Managers"*, New Age International Publishers, New Delhi,2007.
2. Prassana Chandra, *"Fundamentals of Financial Management"*, Tata McGraw hill, New Delhi,2006.
3. Louderback Joseph G, *"Managerial Accounting"*, South Western College Pub, Australia,2000.
4. Derek Porter, *"Print Management"*, PIRA, UK, 2000.
5. Mendiratta, *"Printers costing and Estimating"*, Print trade India, Delhi, 1999.

PMT 4012: MEDIA ENTREPRENEURSHIP [3 0 0 3]

Entrepreneurs and Entrepreneurship, formal and informal Business Creation - Business Plans and Ideation. Entrepreneurship Routes, Case Studies - Steve Jobs, Warren Bennis, Introduction to Company Creation, Processes of Registration and Incorporation, Company Law. Registration Procedures and Exceptions, Company Procedure and Ethics. Franchising, turn-Key or packaged business, Multi-level marketing schemes. Buying an existing business, Valuation of business, Danger signals. IPR Laws, Copyright Agreements - Short-Term vs. Long-Term Agreements, Media Law and Infringements - Case Studies. Risk Management: Types of risks, mitigation, risk assessment, games to understand the risk involved. Research Methodology for Business Planning: Scouting for business opportunities, Investor Pitch Exercises, Business Plan Formulation and Redesign, Financial Projections for Businesses.

References:

1. Vasant Desai, "*Dynamics of Entrepreneurship Development".*
2. David H. Holt, *"Entrepreneurship: New Venture Creation"*.
3. Satish Taneja, S.L.Gupta, "*Entrepreneurship Development New Venture Creation"*.
4. Marc J. Dollinger, "*Entrepreneurship: Strategies and Resources"*.
5. Brigitte Berger, *"The Culture of Entrepreneurship"*.
6. Peter F. Drucker, *"Innovation and Entrepreneurship".*
7. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, *"Entrepreneurship".*
8. G. Dale Meyer, Kurt A. Heppard, *"Entrepreneurship as Strategy".*
9. CPSC (Colombo Plan Staff College), *"Entrepreneurship Development"*, 1998.

PMT 4013: PACKAGING MANAGEMENT [3 0 0 3]

Packaging prepress management: Introduction to packaging, fundamentals of Package design, prepress designing softwares, Color management tools, Rip solutions and Imaging engines, Pre-flighting software. Packaging production planning and control: Production planning, scheduling and control, material purchasing, inventory and quality control. Work allocation, scheduling dynamics. Packaging management solution and workflow JDF, PDF and CIP3/CIP4. Equipment planning, investing and management. Packaging supply chain management: Introduction, objectives, decision phases, performance drivers and management strategy. Demand forecasting, Judgment techniques, Inventory control types, reasons, inventory models and control. ERP. Packaging Quality Management: Introduction to quality and quality control, , Scientific quality management tools, Value stream mapping, Packaging costing and work measurement: Quality and cost, Costs associated with packaging design, production and transportation, wages and incentives, work measurement and method study, value analysis. Packaging waste management: Wastage Management Techniques, Waste management for food, plastic, corrugated boards. Life cycle assessment for container glass, corrugated packaging: life cycle inventory and environmental impact, influence of EOL situation on life-cycle performance, biogenic carbon handling.

References:

1. Martand T Telsang, *"Production Management"*, S Chand & Co.Ltd, New Delhi,2007.
2. Gary G Field, *"Printing Production Management",* Graphics Arts publishing Inc. Livonia, New York, 1996
3. Porter, Dereck, *"Print Management",* Pira International, Leatherhead survey,1993.
4. Geis, A John, *"Printing Plant layout and Facility Design Hand book"*, GATF. Pittsburgh, Pennsylvania,1991.
5. Salvendy, Gavriel, *"Hand book of Industrial Engineering"*, (2e), John Wiley & Sons, Inc., New York, 1991.
6. Merit, Don, *"Excellence in Scheduling Print Production"*, Don Merit, New York,1992.

PMT 4014:PRINT MAINTENANCE ENGINEERING [3 0 0 3]

Maintenance Management: objectives, maintenance management principles, factors affecting size, types, approaches, classification, Instruments to monitor, Repair cycle, Economic life cycle of machine. scheduling, check lists for maintenance. Condition Monitoring: Methods, types, instruments, frequency of condition monitoring and advantages, measurements. Lubrication and Lubricating devices: Application, types of lubricants, functions, characteristics. Functions of lubricating department, lubricating systems Safety precautions, Lubrication film conditions. Pneumatics: Introduction, advantages, Compressor type. Centralized & decentralized compressed air system. Factors for designing the compressor system, accessories of compressors. Methods to dry the compressed air, line regulators, valves for pneumatic systems, Maintenance & troubleshooting. Mechanical Drives: Chains, sprockets, roller chain types, Lubrication and maintenance. Belt & pulleys, Cams- types, types of roller follower, Gears advantages, factors affecting the selection of gears, Gear Failure- wear & tear. Hydraulics: Pascal's law, hydraulic system, maintenance process, hydraulic pumps, valves, Hydraulics in printing, advantages & disadvantages. Bearings: Bushing & bearings- selection, classification, Lubrication, oilless bearings. Bearing Failures, causes & cures, bearing damages. Productivity Maintenance in printing industry: 3 C's of maintenance, Inking rollers, dampening rollers, roller problems, devices to measure roller pressure. Plate blanket packing, impression cylinder & blanket setting, Troubleshooting of blanket problems, dampening. Preventive maintenance, maintenance in prepress & post press devices.

References:

1. Rizzo Kenneth E., *"Total Production Maintenance",* GATF, USA, 2002.
2. Sahu G.K., *"Pumps",* New age international Publishers, New Delhi, 2000.
3. Majumdar S.R., *"Pneumatic Systems Maintenance",* Tata Mcgraw, New Delhi, 1995.
4. Khurmi R.S., *"Machine Design"*, S. Chand and Company, New Delhi, 2002.
5. Garg H.P., *"Industrial Maintenance"*, S. Chand and Company, New Delhi, 1999.
6. Peter Vas, *"Parameter Estimation, Condition monitoring and Diagnosis of electrical machines"*, Oxford science publications, 2001.
7. B.K.N. Rao, "*Hand Book of Condition Monitoring",* Elsevier Science Ltd,1996.
8. R. Halmshaw, *"Non-destructive Testing (Metallurgy & Material Science)"*, (2e), 1991.

PMT 4015: PRINTRONICS [3 0 0 3]

Printed electronics and its applications: Printed electronics, applications, advantages, Developments different products, market share. Industries and research associations involved, Future scope for printed electronics. Printing processes and image carriers: Gravure, screen, inkjet, pad, offset andflexo printing. Chemical etching processes. Technical parameters, Substrates and their Properties: Flexible and paper substrates - specifications, surface treatment, chemical behaviour, temperature and electrical properties, phenomenon of ink drying on absorbent and nonabsorbent substrates. Inks and their properties: polymer and water based conductive inks , formulations, carbon nanotube and silver nanotube. electrical and magnetic characteristics of printed organic devices. Printed electronic products and quality control: PCB, RFID, OLED, OFET, printed batteries, flexible display, smart packaging, photo detectors, solar cells - construction and working principles. Calibration, characterization and standardization. Quality control and measuring devices.

References:

1. *"Gravure Process and Technology"*, Gravure Education Foundation and Gravure Association of America. Rochester, New York,2003.
2. Pudas, M., Halonen, N., Granat, P., Vahakangas, J., *"Gravure Printing of Conductive Particulate Polymer Inks on Flexible Substrates",* Progress in Organic Coatings,2005.
3. MaithieuFenoll, RobertCatusse, ElianeRousset, *"Gravure Printing: Material Characterization For All Organic Capacitor"*, Iarigai, Advances In Printing And Media Technology Vol-32,2009.
4. Ajay Nedle, Chanachai Poosri , *"Carbon nano tubes"*, International School of Engineering, Chulalongkorn University, Bangkok, Thailand, 2009.
5. Teromustonen, *"Inkjet printing of carbon nanotubes for electronic applications"*, Acta UniversitatisOuluensis,2009.
6. Freudenrich, Craig, *"How OLEDs Work?"*,Howstuffworks, 2008.

PMT 4016: QUALITY MANAGEMENT FOR GRAPHIC ARTS [3 0 0 3]

Introduction: Definition, basic elements, characteristics, applications, quality principles and TQM models. Quality gurus and their ISO:9000 (2000), ISO:14000, QS:8000 standards. Statistical Process Control: Introduction, SPC tools. Process capability indices, DOE, OVAT, OEE,

Case study and problems. Process Re-engineering and Sustaining Total Quality: Principles, requirements, steps, re-engineering and TQM. Bench marking and Kaizen. Team Approach: Introduction, basic assumption, quality improvement teams, quality team effort, quality-oriented projects, action team development and training. Supplier Certification Process: Internal and external suppliers and customers, analysis of supplier, supplier certification process, services offered by the supplier. Economics of Quality Improvement: Cost of quality, categories, relationship between the cost element and strategies for cost reduction. Implementing quality cost measurement system. Data collection, principles and analysis. Measurement of critical print variables.

References:

1. Bhat K.S., *"Total Quality Management",* Himalaya Publishing House, Bangalore,2005.
2. Arora S.C., *"Applying ISO 9000 Quality Management System",* International Trade Centre, Switzerland,1996.
3. Herschel L.A., *"Implementing TQM in Graphic Art"*, Pira and GATF, Pittsburg, 1995.

PMT 4017: RADIO TECHNOLOGY [3 0 0 3]

AM & FM Transmitter principle, Block diagram and principles of amplitude modulated and frequency modulated transmitters, Broadcast transmitters, master oscillators, frequency multiplier, high and low level modulation system, antennas, Studio equipment and control room apparatus, OB equipment and receiving center's facilities. Radio Wave Propagation Communication receiver, super heterodyne receiver, Intermediate frequency, image frequency rejection. Receiver characteristics and measurement, Design considerations of modern broadcast receivers, antennas. FM transmitters and receivers, Basics of Satellite and mobile communication systems.

References:

1. AM Dhake, *"Television and Video Engineering",* Prentice Hall of India(P) Ltd., New Delhi
2. George Kennedy, *"Electronic communication system",* Prentice Hall of India(P) Ltd., New Delhi.
3. S.P. Bali, *"Consumer Electronics"*, Pearson Education, 2005.
4. David E Reese and Lynne S. Gross, *"Radio Production Worktext : Studio and Equipment"*, Focal Press, 2002.
5. Graham Jones, *"A Broadcast Engineering Tutorial for Non-Engineers"*, Focal Press, 2005.

PMT 4018: TELEVISION TECHNOLOGY [3 0 0 3]

Digital Video Camera System, Fundamentals of digital video, Sampling and Quantization of motion, Fundamentals of Television, Receiver Scanning, Composite Video signal, Need for synchronizing and blanking pulses, Picture Tubes, Construction and working of Camera Tubes, Color Television systems, Colour cameras and picture tubes, Propagation of television signal. NTSC, PAL, SECAM systems. Digital Television, Digital equipments for TV studios Television and Video Broadcasting, CCU, Colour bars, Vectorscope, Waveform monitor, Broadcast standards, Video formats; types of Videotapes, Transmission facilities; transmission through mobile phones and microwave transmitters, Transmission technologies.

References:

1. AM Dhake, *"Television and Video Engineering"*, Prentice Hall of India(P) Ltd., New Delhi.
2. George Kennedy, *"Electronic communication system"*, Prentice Hall of India(P) Ltd., New Delhi.
3. S.P. Bali, *"Consumer Electronics"*, Pearson Education, USA,2005.
4. Adrian Davies, *"Close-Up and Macro Photography"*, Elsevier, Inc., Focal Press, USA, 2010.
5. Ken Milburn, *"Digital Photography: Expert Techniques"*, O'Reilly, USA, 2006.
6. David D. Busch, *"Mastering Digital Photography"*, Course Technology, USA, 2006.

MCA 4001: GRAPHICS AND WEB DESIGNING [3 0 0 3]

Multimedia and components, Overview of Multimedia Software Tools, Music Sequencing and Notation, Digital Audio Graphics and Image Editing, Video Editing, Animation, Multimedia Authoring Multimedia and Hypermedia, World Wide Web, HTTP, HTML, XML, CSS, Java Scripts, Dynamic HTML Design issues, page layouts, web hosting, Graphics and Image Representation, Graphics system, Line and circle drawing algorithms, Filling algorithms, clipping algorithms, 3D graphics, 3D modelling, Transformations. Image and its representation, Colour Images, Colour System, Popular File Formats Basics of Digital Audio, Fundamental Concepts in video, Types of Video Signals, Chroma Subsampling Video standards Multimedia Data Compression, Basics of Information theory, basic lossless and lossy compression techniques, JPEG, Basic Video Compression Techniques, MPEG I, MPEG II, Multimedia Communication, Computer and Multimedia Networks, Basics of Computer and Multimedia Networks, Multimedia over IP. Multimedia Application Development, Software life cycle, Conceptualization, Content Collection and Processing, Story, Flow line, script, story board, Implementation, authoring metaphors, testing and feedback - Case study.

References:

1. Ze-Nian Li and Mark Sdrew, *"Fundamentals of Multimedia"*, ISBN: 0130618721, Prentice-Hall, 2004.
2. Ranjan Parekh, *"Principles of Multimedia"*, Tata MC Graw Hill.
3. D. Hearn and M.P. Baker, *"Computer Graphics"*, (2e), PHI.
4. TayVaughan TMGH, *"Multimedia: Making it work"*, New Delhi,1998.
5. Ralf Steinmetz and N Jersey, *"Multimedia: computing, communications and applications"*, PHI, 1995.
6. Kamal Raj, *"Internet and web technologies",* Tata Mc Graw Hill publishing Company Ltd. New Delhi, 2002.
7. Jon Duckett, *"Beginning web Programming with HTML, XHTML and CSS"*, Wiley Publishers, 2004.

OPEN ELECTIVES

PMT 3281: FUNDAMENTALS OF ADVERTISING [3 0 0 3]

Advertising Theory, Growth of advertising in India, advertising as a tool of communication, Functions of advertising, Benefits of advertising, Advertising as a Marketing Tool, Advertising as a PR Tool, Advertising Theories, Relevance to Indian Advertising, Role of advertising in National Economy, Types of Advertising Agency and types of services offered, structure of ad agencies, creativity in advertising, appeals & execution styles, planning & development, creative process & tactics, media planning, Advertising Medias - television networks, magazines, newspapers, radio, selection and buying media time & space, Support media internet, interactive medias, out-door, in-store, direct mail, miscellaneous and transit advertising, advertising campaign, corporate advertising, case studies.

References:

1. Jethwaney Jaishri and Jain Shruthi, *"Advertising Management",* OUP, ND, 2006.

2. Surmanek Jim, *"Advertising media A to Z",* Tata McGraw-Hill Publishing Company Limited, New Delhi, 2004.
3. Wells William, *"Advertising",* Prentice hall, New Delhi, 2002.
4. Jefkins Frank and Yadin Daniel, *"Advertising",* Prentice hall, New Jersey, 2000.
5. Wilmshurst Jhon and Mackay Adrian, *"Fundamentals of advertising"*, MGH, Boston,1999.

PMT 3282: GLOBAL MEDIA AND ENTERTAINMENT [3 0 0 3]

Sound Recording Industry, Telegraphy and wireless, Development of Radio in India, Television in India, Television Concept, production workflow, production people and equipment, television and mounting equipment, camera operation and picture composition, techniques of television lighting, audio sound pickup and sound control, video recording and storage systems, post-production, Motion Pictures, alternate cinema, contemporary Indian cinema, business of films today, Digital Film Making, Script writing, Screenplay writing, story board, Scheduling, Digital video components, HD and SD video, Choosing a camera, Planning the shoot, Production sound, Shooting and Directing, Sound editing and color correction, Title and effects, finishing.

References:

1. Sonja Schenk and Ben Long, *"The Digital Film making Handbook"*, Course Technology, a part of Cengage Learning, USA, 2012.
2. Herbert Zettl, *"Television Production Handbook",* Thomson Wadsworth, USA, 2006.
3. Nicholas T. Proferes, *"Film Directing Fundamentals"*, Focal Press, USA, 2008.
4. Dina Appleton, Daniel Yankelevits, *"Hollywood Deal making: Negotiating Talent Agreements for Film, TV and New Media"*, Skyhorse Publishing, 2010.
5. Patrick Colm Hogan, *"Understanding Indian Movies: Culture, Cognition, and Cinematic Imagination",* University of Texas Press, 2008.

PMT 3283: GRAPHIC DESIGNING [3 0 0 3]

Importance of a good design, Impact of a design on various target audience. Role of graphic designer, elements of design. Principles of design. Language as a communication tool. Legibility and readability. Newspaper: Effect of television and magazines, design approach, form and format, design elements. Books: Anatomy, page layout, cover design, design approach. Magazines: classification, editorial plan, design approach. Posters:Indian context, strengths and weaknesses, rules, creativity, design approach. Direct Pieces:Letterheads, business cards, envelopes, brochure, booklet. Souvenir Items - calendars and diary. Website: Factors to consider, importance of a site map, content creation, co-ordination of work between various departments, selection of color. Advertising Commercials, Corporate and Industrial Films:Designing for advertising- use of appeal, creativity and strategy. Design approach- SHDA (Stop Hold Desire Act formula), design execution. Scratch, storyboard and final presentation, design approach, job flow and co-ordination between various departments.

References :

1. Ferrell O.C., Fraedrich J.P. and Ferrell Linda, *"Business Ethics Ethical Decision Making and Cases"*, Biztantra, New Delhi, 2006.
2. Sarkar N.N, *"Designing print communication",* Sagar Publications, New Delhi, 1998.
3. Albert C. and Schick C. Dennis, *"Fundamentals of copy and layout",* National Text Book Company, Illinois,1997.
4. Lawson Bryan, *"How designers think"*, Butterworth Architecture, London,1980.

PMT 3284 : NEWSPAPER TECHNOLGY [3 0 0 3]

Editorial workflow: Introduction to newspaper organization. The policy of newspaper. Flow of stories into a newspaper office; the various sources for each page. Human Resource for Newspaper Organization. Fascimiles copy & photographs. Editorial content and news. The OP-ED page. Newspaper layout & design: The language of Layout & Design. Laying out pages. Working in modules. Elements of newspaper. Specialized applications in design. Quality control of Newsprint: Structural, optical and mechanical characteristics and testing. Establishing quality control system. ISO 9000 and SNAP. Newsprint Management: Reel and Core Characteristics. Reel Handling, transport and Storage. Web handling: Reel stands, components, operation and web control devices. Press: Configurations and settings. Standardization and optimization. Digital presses. Press folders & Mailroom: Folders- Configuration and setting. Mailroom operations.

References:

1. Moen Deryl R, *"Newspaper Layout & Design A Team Approach"*, Iowa State University Press, 2004.
2. Harrower Tim, *The Newspaper Designers Handbook*, (5e), McGraw Hill Publications, Boston, 2002.
3. Kipphan Helmut, *"Hand book of print media",* Springer, Germany, 2001.
4. WAN-IFRA, *"Newsprint and Newsink Guide"*, World association of Newspaper and news publishers, Germany,1993.

PMT 3285: PACKAGING DESIGN & DEVELOPMENT [3 0 0 3]

Packaging in modern society, Packaging and marketing, Designers role. Designer's qualifications, Design as an aspect of Marketing, packaging specifications and quality assurance, Paper, Paper board and structural design - Types of paper and paper board, Working with paper and boards, Folding cartons, Corrugated containers - Designing and manufacturing, testing corrugated containers, stacking strength, Plastics and Flexible packaging: Natural plastics, Development of synthetic plastics, Chemistry of plastics. Classification of polymers, Techniques used to mold and shape plastics. Other uses of plastics, designing with plastics, Rigid packaging: Glass making, producing glass containers, types of glass containers, decorating glass containers, designing a fragrance bottle, phases of designing a bottle, Cans, tubes and aerosols, designing cans, metal tubes, plastic tubes, and the aerosol can, Environmental: implications of packaging: Solid waste disposal, Packaging regulations weight and measures, food regulations, cosmetic regulations. tamper evident packaging, other laws and regulations, recycling of packaging, Latest trends in packaging - Advancements in package designing tools, Smart packaging technologies, aseptic packaging, advancements in packaging machineries.

References:

1. Hanlon Joseph F, *"Handbook of Package Engineering"*, CRC Press, USA,1998.
2. Prakash Shetty, *"Science and Technology of Printing Materials"*, MJP Publishers, Chennai,2008.
3. Athalye A.S, *"Plastics in Packaging"*, Tata McGraw-Hill, New Delhi, 1992.
4. BristonJohn, *"Advances in Plastic Packaging Technology",* PIRA, UK, 1992.
5. Laszlo R, *"Packaging Design an Introduction"*, VNR, 1990.

6. Chakravarty B,*" A Hand Book for Printing and Packaging Technology"*, Galgotia Publications, 1997.
7. Aaron I. Brody, Kenneth S. Marsh, *"Encyclopedia of Packaging Technology",* Wiley, New York. 1998.
8. Laszlo Roth, *"Packaging Design"*, Van Nostrand Reinhold, New York, 1989.

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References:

1. Rob Kitchin and Duncan Fuller, *"The Academic's Guide to Publishing"*, Vistaar Publications, New Delhi, 2005.
2. Melvin Mencher, *"News Reporting and Writing"*, (8e), McGraw Hill Publication, 2000.
3. Fred Felder, *"Reporting for Media"*, Harcourt Publication, London,1997.
4. Tim Harrower, *"The Newspaper Designer's Handbook"*, (5e), McGraw Hill Publication, 2002.
5. Claudette, *"Reporting and Production for Digital Media"*, Surjeet Publication, Delhi,2005.