# DEPARTMENT OF PRINTING ENGINEERING

# JADAVPUR UNIVERSITY

## SYLLABUS OF 4-YEAR B.E. PRINTING ENGINEERING

## Second Year First Semester

### PRN/PC/B/T/211: DIGITAL TYPE SETTING

**Module 1**

Evolution of photocomposition: Evolution of phototype setting systems from hot-metal composition to digital composition environment. Desktop publishing.

**Module 2**

Text and image input devices: Types of input devices; Keyboards: layout coding and structures. Keyboards for multilingual word processing. Mouse. Storage media: Types of storage media. Magnetic memories, Semiconductor memories, Optical memories. Comparison and evaluation of various storage media.

Output devices: Types. Display devices. Printers, plotters and typesetters.

**Module 3**

Software elements: Text editors. Word processors.Page layout packages.Graphics packages. OCR. Text file formats and file exchange.

**Module 4**

Page composition: Editing and correction. Text alignment. Tables and columns. Indexing. Scientific composition. Text image integration. Pagination. Digital typography: Generating methods of digital type faces. Font manipulation. Page description languages: Way of working. Postscript and display postscript and other page description languages.

**Course Outcome:**
The students of the course should be to
CO1: Explain various generations of photo typesetting systems. (K2)
CO2: Explain the role of input devices in digital type setting. (K6)
CO3: Describe the memory devices. (K1)
CO4: Discuss page layout systems. (K2)

**CO-PO Mapping (3-Strong, 2-Moderate and 1 –Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | 3 | 2 | 1 | | | | | | | | | | 1 | | |
| **CO 2** | 3 | 2 | 1 | | | | | | | | | | 2 | | 1 |
| **CO 3** | 3 | 2 | 1 | | | | | | | | | | 2 | | 1 |
| **CO 4** | 3 | 2 | 1 | | | | | | | | | | 3 | | 3 |

**PRN/PC/B/T/212: PRINTING M/C DESIGN:**

**Module 1**

Basic idea of machine design, analysis, itemization, empericism, approximation and synthesis, design decision.

**Module 2**

Permanent and detachable fastening devices, bolts, nuts, screw, keys, pin and retainers, their types and appropriate applications.Threaded joints, types and causes of threaded failures; Bolts without and with preloading; joints using gaskets.

**Module 3**

Torque transmitting elements: Shaft couplings, pulleys - their types and design features. Kinematic analysis of spur and bevel gears, worms and worm wheels.Specification and selection of bearings.Simple structure and foundation equipment.

**Module 4**

Basic idea of design & analysis, Concepts of fits & tolerances, design of typical machine elements,

**Module 5**

Design & drawing of gear box, worm, worm wheel, stop-valve, journal bearing, clutch, etc. Design aspects of sheetfed offset and web offset printing machines.

**Course Outcomes**

The students of the course should be able to

CO1: Describe

design philosophy, methodology and design considerations. (K2)

CO2: Describe design principles of fastening devices like nuts, bolts, screws etc. (K2)

CO3: Classify different types of shaft coupling, pulleys along with their design features. (K2)

CO4: Apply design principles for belt drives, chain drives, gear drives (K3)

CO5: Apply design methodologies for different types of gears, rolling contact bearings, clutch. (K3)

CO6: Assess the design aspects of offset printing machines. (K3)

**CO-PO Mapping: (3-strong, 2-moderate and 1-weak)**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | 1 | | | 1 | 1 | 1 | | | | | | | |
| CO2 | 3 | 2 | 1 | | | | | | | | | | | | |
| CO3 | 3 | 2 | 1 | | | | | | | | | | | | |
| CO4 | 3 | 2 | 1 | | | | | 2 | | | | | | 1 | |
| CO5 | 3 | 2 | 1 | 1 | | | | | | | | | | 1 | |
| CO6 | 3 | | 1 | | | | | | | | | | | | |

## PRN/PC/B/T/213: PRINTING TECHNIQUES

### Module 1

An introduction to different printing processes such as letter press, lithography/offset, gravure, intaglio, flexography, and screen printing. A short history of the printing process.

### Module 2

Letterpress: an introduction to typographic design, type details, measurements, point size, lead, page make-up, proof reading and corrections, general awareness of the factors which decide the choice of typeface, etc. Methods for graphic block reproduction, line and halftone production. Introduction to letterpress printing machines, introduction to different type setting methods.

### Module 3

Nonimpact Printing: Introduction to digital printing, thermal printing, laser printing, ink-jet printing etc.

### Module 4

Screen printing : Screen printing principle, Screen mesh, Screen printing
frames, Screen pretreatment, Degreasing, Different method of stencil preparation, Multicolor reproduction, Screen printing problems and solutions, Screen ink and their properties, Machinery configuration. Latest developments and applications in screen process printing.

### Course Outcomes

The students of the course should be able to
CO 1: Memorise different printing processes (K1)
CO 2: Describe letterpress printing process. (K2)
CO 3: Discuss screen printing (K2)
CO 4: Assess screen printing problems and solutions (K3)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | | | | | | | | | | | | |
| CO2 | 3 | 2 | 1 | | | | | | | | | | | | |
| CO3 | 3 | 2 | 1 | | | | | | | | | | | | |
| CO4 | 2 | 3 | 1 | | | | | | | | | 2 | | 2 | |

**PRN/PC/B/T/214: PACKAGING TECHNIQUES – I**

**Module 1**

Introduction: Definition; Packaging criteria: appearance, protection against chemical andphysical hazards, functions regarding end use performance and machine performance, cost and cost effectiveness and disposability.

**Module 2**

Packaging Materials, Properties And Packaging Forms:Wood: properties, decay and preservation of woods, forms of wood; Paper and paper boards:properties, types and their applications; Corrugated boards; Glass: properties, kind of glasses,glass package forms, their finishes and closers; Metals and Foils: Properties and uses, packageforms; Polymers: Types, their properties and applications; laminates, fibers; adhesives:properties, kinds and their applications. Aerosols.

**Module 3**

Generals packaging forms: bag, pouch,blisters, strip, collapsible tubes, cans. Packaging Production: Manufacturing and fabricationprocesses: Injection molding, blow molding, thermoforming, rotational molding, extrusion,compression molding; Lamination: processes and their applications; Labeling; Varnishing;Decorating: vacuum metallizing, electroless and electrolytic plating; filling; sealing; Cartoning: die cutting and punching.

**Module 4**

Food packaging: Food decay, methods of food preservations; Asepticpackaging: definition, sterilization methods.

**References:**

Evans, C.W. John, Trends in Paper and Paperboard Converting, Lockwood TradeJournal Co.
Handbook of Package Design Research, Walter Stern Wiley Intascience.
Hankn,Joseph F., Handbook of Package Engineering, McGraw Hill Co.
Long, Robert P., PackagePrinting, Graphic Magazines.
McGuive, Patric E., Packaging and Paper Converting, PalmertonPublishing Co., New York.

Paine, F.A., Fundamentals of Packaging, Brookside Press Ltd., London.
Paine, F.A., ThePackaging Media, Blackie & Sons Ltd., London.
Patne, A.M., Development in Binding andPackaging, MIPT, Pune.
Plastics Engineering Handbook, The Society of Plastics Industry Inc.,VNR, New York.
Sutnar, Ladislav, Package Design: The Force of Visual Selling, Arts Inc.,New York.

**Course Outcomes**

The students of the course should be able to
CO 1: Describe the different packaging aspects, materials and processes (K2)
CO 2: Illustrate the methods of different package forming (K2)
CO 3: Calculate the packaging parameters (K3)
CO 4: Compare between packaging materials and processes (K4)

CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | | | | | | | | | | 1 | | |
| CO 2 | 2 | 1 | 3 | | | | | | | | | | 1 | | |
| CO3 | 2 | 3 | 1 | | | | | | | | | | | 1 | |
| CO4 | 1 | 2 | | 3 | | | | | | | | | | 1 | |

**PRN/PC/B/T/215: PAPER TECHNOLOGY**

**Module 1**

Raw materials for paper manufacturing - structure of cellulose, hemicellulose, and lignin and extractives.

**Module 2**

Pulping mechanical and chemical pulping, different types of paper produces from different types of pulp. Bleaching, wastepaper utilisation and de-inking, stock preparation. Internal sizing, effect of fillers to improve printability of paper, Colouring of paper.Fourdrinier paper machine, cylinder machine, Pressing, Drying.Calenders, Super calenders, Embossers, Surface treatment of paper and board-lamination, corrugating, paper reinforcement by polymer addition, different types of coating. Paper cutting.Standard sizes of papers.

**Module 3**

Fibre analysis. Paper defects - dirt in papers, speck analysis.

**Module 4**

Properties of paper - Structural properties, Physical properties, Strength properties, optical properties, resistance properties, chemical properties.On-line measurement of paper properties.

**Course Outcomes**

The students of the course should be able to

CO 1: Describe the raw materials and different steps of paper manufacturing (K2)

CO 2: Describe wastepaper utilization, de-inking, stock preparation, internal sizing, effect of fillers to improve printability of paper and colouring of paper (K2)

CO 3: Explain and illustrate different paper manufacturing machines and different surface treatment and sizes of paper (K2)

CO 4: Demonstrate measurement and application of different properties of paper (K3)

**CO-PO Mapping**

**(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 2 | | | | | | | | | | | 1 | |
| CO 2 | 3 | 2 | 1 | | | | | | | | | | | 1 | |
| CO3 | 3 | 2 | 1 | | | | | | | | | | | 1 | |
| CO4 | 1 | 2 | 3 | | | | | | | | | | | 1 | |

**PRN/BS/B/T/216: MATERIAL SCIENCE**

**Module 1**

Structure of materials: Crystal systems, unit cells and space lattice; determination of structures of simple crystals by X-ray diffraction; Miller indices for planes and directions, Fick´s laws of diffusion, doping of semiconductors and surface hardening of metals. Hydrocarbons, Alcohols, Fatty acids, Amines & Amides.

**Module 2**

Polymers: classification, polymerization, structure and properties, additives for polymer products, processing and application, Introduction to photopolymers,

**Module 3**

Liquids & suspensions, emulsions, surfactants, adhesives & their general properties. Interfacial surface tension, spreading of liquid on a surface, capillary action. Viscosity, Poiseuille's equation.

**Module 4**

Pigments and dye staffs, oils, resins, solvents etc. Composites, Alloys, Corrosion and environmental degradation of materials (metals, ceramics and polymers).

Reference: * Handbook of Plastics * R.H. Leach, Printing Ink Manual

**Course Outcomes**

The students of the course should be able to

CO 1: Classify and describe different materials, their applications. (K2)

CO 2: Describe details of crystal systems, determination of structure and miller indices, atomic structure and bonding. (K2)

CO 3: Demonstrate and describe diffusion laws, surface hardeneing, corrosion and environmental degradation of materials. (K3, K2)

CO4: Define surface tension, viscosity and describe various aspects of spreading of liquid on surface, capillary action and related governing laws. (K2)

CO 5: Solve problems related to different materials and mechanisms. (K3)

**CO-PO Mapping**

**(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 1 | | | | | | | | | | | 1 | |
| **CO 2** | 3 | 2 | 1 | | | | | | | | | | | 1 | |
| **CO3** | 3 | 2 | 1 | | | | | | | | | | | 1 | |
| **CO4** | 3 | 2 | 1 | | | | | | | | | | | 1 | |
| **CO5** | 1 | 2 | 3 | | | | | | | | | | | 2 | |

**PRN/PC/B/S/211: GRAPHIC DESIGN LAB**

**Module 1**

A complete design and layout of magazine /periodicals/brochure/leaflet/booklet is to be submitted at the end using following steps

1. .Fundamentals of design principles, Introduction to

Design and page layout softwares like quarkxpress, Freehand, Indesignetc

2. The Interfacepalettes and toolbox

3. Creating Boxes: Intro to Boxes, Auto Create Text Box, CreateText/Picture Boxes, Import/export Text, Highlighting/deleting Text,

4. Formatting Text :Preference Palette, Changing Fonts, Size and Resize, Type Styles, Color/shades, Kerning Type,Tracking Words, Horizontal/vertical Scaling, Smart Quotes,Textbaselines , Text Orientation,Convert Text to Box

**Module 2**

5. Working With Lines and Creating Pictures : Create Picture Box, ResizePicture Box,Import Pictures, Resizing Pictures Within a Box, Cropping Pictures, Rotating Picture Boxes,Rotating Pictures Within Box, Skewing Pictures Within Box, Flipping a Picture, ModifyingColor and

Shade of Pictures, Contrast Settings to Pictures, Custom Halftone Screens, Listing andUpdating Picture Paths
6. Multiple Items: Select Multiple Items, Duplicate/step and Repeat ,Group and Ungroup Items, Lock Items, Stacking Order of Items, Space and Align Items, AnchorImages Into Text
7. Text and Images: Measurement Palette, Text Over Images, Wrap TextAround Image/box, Clipping Paths, Runaround, Special Clipping Effects, Rotate/skew and FlipText/Box, Text Inside Image Shapes 8. Beziers: Introduction to Beziers

**Module 3**

9. FormattingParagraphs: Alignment, Leading, Indents, Hanging Indents, Paragraph Spacing, Drop Cap' InsertRule Above/below, Tab Inserts, Widow and Orphan Line Control, Hyphenation and Justification
10. Tables : Create New Table, Table Placement, Resizing Rows and Columns, Insert/DeleteColumns and Rows, Convert Tables to Text, Creating Tables in a Web Document

**Module 4**

11. StyleSheets: Create New Style Sheet, Paragraph Based on Existing, Apply a Style Sheet, AppendStyle Sheets, Compare Style Sheets
12. Master Pages: Create New Master Pages, Format andApply Master Pages, Modify Master guidessettingWeb Page Properties, Number Pages,Linking Text with Master Pages
13. Working With Color: Overview Of Color Models, ColorsPalette, Create New Color , Edit/duplicate/delete Colors, Re-color Text, Re-color Frame/gap, RecolorBox , Color Blends
14. Layers: Intro to Layers Palette, Creating New Layers, ArrangingLayers, Merge Layers, Determine Item Layer, Creating Items on a Layer, Moving Items toDifferent Layer Locking Items on Layers
15. Libraries: Create Library, Add/delete Library Items
16. References: Create a Book, Add/delete Chapters, Status Columns, Page Numbering Books,
Synchronize Chapters, Print Chapters, Create New List, Build and Preview List

**References:**

Mortimer Pamela, Document Design Primer, GATF
Blanchard Russell W., Graphic Design, Prentice-Hall, Inc.
Croy Peter, Graphic design and reproduction techniques, Focal Press

**Course Outcome**

The students of the course should be to
CO1: Produce text effects in document layout. (K3)
CO2: Produce image effects in document layout. (K3)
CO3: Modify and reproduce layout with various colors and style sheet. (K3, K1)
CO4: Adapt and develop final graphic design and layout by using text image integration. (A3, K3)

**CO-PO Mapping (3-Strong, 2-Moderate and 1 –Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 3 | 2 | 1 | | | | | | | | | | 3 | | |
| CO 2 | 2 | 3 | 1 | | | | | | | | | | 3 | | |
| CO 3 | 2 | 3 | 1 | | | | | | | | | | 3 | | |
| CO 4 | 2 | 3 | 1 | | | | | | | | | | 3 | | |

**PRN/PC/B/S/212: SCREEN PRINTING LABORATORY**

**Module 1**

1. Study of different tools, materials and equipments used in screen printing

**Module 2**

2. Preparation of screen stencil in direct photographic stencil process and reproduction through it
3. Preparation of screen stencil in indirect photographic stencil process and reproduction through it
4. Preparation of screen stencil in direct and indirect photographic stencil process and reproduction through it
5. Preparation of screen stencil in capillary direct film process and reproduction through it
6. Printing of multicolour job

**Module 3**

7. Printing on different types of substrate
8. Printed Circuit Board (PCB) making using Screen Process Printing

**Module 4**

9. Study of different running on problems and troubles

**Course Outcomes**

The students of the course should be able to

CO 1: Describe different tools, materials and equipments used in screen printing (K1, A1)

CO 2: Respond screen stencils (A2)

CO 3: Apply printing on substrates (K3, A2)

CO 4: Analyze different running on problems (K4, A2)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | | | | | | | | | | 2 | | |
| CO2 | 1 | | | | | | | | | | | 2 | 3 | 2 | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO3 | 1 | 2 | 3 | | | | | | | | | 2 | 2 | 2 | |
| CO4 | 1 | 3 | 2 | | | | | | | | | 2 | 2 | 1 | |

## Second Year Second Semester

### PRN/PC/B/T/221: PRINTING SURFACE PREPARATION

### Module 1

An introduction to different types of plates used in lithography,

### Module 2

Flow chart of plate making procedures, details of plate graining, basic properties of the colloidal coatings,

### Module 3

Surface chemistry of the plate coatings: colloidal coatings, diazo and photo polymers; the Albumen process of plate making, the deep-etch process of plate making, Wipe-on process of plate making, P.S. plate making, Bi-metal plate making, waterless plate making for lithography.

### Module 4

Introduction to Computer-to-plate Technology

References: * Photolithography; B.E. Tory, Graphic Arts Monthly, Chicago. * Lithographers Manual, GATF. * Advances in Printing Plate Technology, PIRA. * The Complete Guide to Waterless Printing,; John O'Rourke, Quantum Resources Inc.

**Course Outcomes**

The students of the course should be able to

CO 1: Describe the different types of plates used in Offset Lithography (K2)

CO 2: Prepare the different types of plates used in Offset Lithography (K3)

CO 3: Differentiate between the different types of Plates with merits and demerits (K4)

CO 4: Analyse the different Printing Plates in terms of runs, print quality, processes, materials, etc (K4)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | | | | | | | | | | 2 | 2 | |
| CO 2 | 2 | 3 | 1 | | | | | | | | | | 1 | 1 | |
| CO3 | 1 | 1 | 2 | 3 | | | | | | | | | | | |
| CO4 | 2 | 3 | | 1 | | | | | | | | | | | |

**PRN/PC/B/T/222: DIGITAL PRINTING**

**Module 1**

1. Digital printing technologies: overview of digital printing, electro photography, ink-jet (thermal,piezoelectric, continuous), thermography, computer-to-plate (CTP), computer-to-press (directimaging DI) etc.
2. Digital Prepress: digital photography, scanners, screening techniques, page description languages-PostScript, PCL, PDF (PDF/X and it's flavors), raster image processor (RIP), workflow integration,color management.
3. Digital Proofing: technologies used for digital proofing, hard proofing, soft proofing, halftonessimulation (dot proofing), remote proofing, preflight, SWOP/GRACoL certification for proofingsystems.

**Module 2**

4. Evaluation of Quality: objective (colorimetric) and subjective (visual) assessment of printingtechnology (devices), image quality attributes, print quality verification tools, standardization - ISO,SWOP, GRACoL.

**Module 3**

5. Variety of Applications: customization and direct marketing, Print-on-Demand (POD), variabledata printing (VDP), distribute-and-print, remote publishing (Web2Print), wide-format printing,specialty applications (particularly of inkjet) like 3D printing, printing on microscopic items etc.

**Module 4**

6. Trends in Digital Printing: evolution of technologies, current market share of differenttechnologies, promising developments (e.g. Xerox iGen3, HP Z-series inkjet printers with in-builtspectrophotometer etc), future trends, eco-friendliness.

**References**

Brett, G, Digital Prepress Technologies, Leatherhead: Pira International, 2001.
Brett, G, Short-run Digital Colour Printing, Leatherhead: Pira International, 2001.
H. Kipphan, Handbook of Print Media, ISBN: 3-540-67326-1 Springer-Verlag Berlin Heidelberg,2001.
Lake, M., The future of Digital Colour Printing: Key global markets and Forecasts, Leatherhead: PiraInternational, 2004.
Martin, G., Non-impact Printing, Leatherhead: Pira International, 1993.
Smyth, S., Digital Commercial Printing, Leatherhead: Pira International

**Course Outcome**

The students of the course should be to

CO1: Discuss digital printing technologies (K2) 40

CO2: Analyze digital prepress. (K4) 30

CO3: Describe digital proofing. (K2) 20

CO4: Evaluate varieties of application (K6) 10

**CO-PO Mapping (3-Strong, 2-Moderate and 1 –Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 3 | 2 | 1 | | | | | | | | | | 1 | 2 | |
| CO 2 | 2 | 3 | 1 | | | | | | | | | | 2 | | |
| CO 3 | 2 | 3 | 1 | | | | | | | | | | 2 | 2 | |
| CO 4 | 2 | 3 | 1 | | | | | | | | | | 3 | | |

**PRN/PC/B/T/223: PACKAGING TECHNIQUES –II**

**Module 1**

Different types of distribution hazards - mechanical hazards, climatic hazards etc.
Basic considerations for protection of packaged items.

**Module 2**

Theory of cushioning, application of stressanalysis to packaging behavior.
Optimum cushioning selection.Shock absorption.Differentcushioning materials.Suspension systems of the packaged items.
Impact vibration, designconsideration for isolation of vibratory forces.

**Module 3**

Evaluation and testing of package performance.
Drop tester, inclined impact tester, Compression and vibration testing.
Principle ofaccelerometer.Laboratory transport testing methods.

**Module 4**

Economy of packaging, influence ofmoisture, protective functions.
Dehumidification, humidity control and dehumidification methods.
Shelf life of packaged articles, accelerated testing method, half value period method, some case studies.
Application of computers in packaging.Safety and maintenance.

**Course Outcome**

The students of the course should be able to

CO1: Explain different types of distribution hazards and theory of cushioning. (K2)

CO2: Describe design considerations for isolating mechanical shock and vibratory forces. (K2)
CO3: Analyse the package performance characteristics through different testing procedure and also the effect of change of packaging cost on it. (K4)
CO4: Evaluate the shelf life of moisture sensitive packaged products. (K5)

**CO-PO Mapping: (3-strong, 2-moderate and 1-weak)**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | | | | | | | | | | | | |
| **CO2** | 3 | 2 | 3 | | | | | | | | | | | | |
| **CO3** | 3 | 2 | 2 | 1 | | | | | | | | | | | |
| **CO4** | 3 | 2 | 3 | 1 | | 2 | | | | | | | | | |

## PRN/PC/B/T/224: INK TECHNOLOGY

### Module 1

Nature of printing ink - visual characteristics, drying characteristics, adhesive nature, resistance properties.

### Module 2

Raw materials of printing inks: Pigments and dyestuffs, oils, solvents, resin, plasticisers, driers, waxes, surfactants, antioxidants and other additives,

### Module 3

Letterpress inks. Lithographic inks, Flexographic inks, Gravure inks, Screen inks - General characteristics, Physical properties, drying mechanism, formulation, inks for specific end-use application (ink for different types of plastics, paper, metallic ink, fluorescent inks, stamp inks), ink related problems and possible solutions, fugitive ink. Future trends.

### Module 4

Radiation curable systems - Infra-red curing, ultra-violet curing, micro-wave and radiofrequency drying, electron-beam curing Radiation curable equipments, future trends.

### Module 5

Manufacturing of inks - Manufacturing process - mixing and milling equipments, manufacture of news inks.Handling, transportion and storage, future trends.Health and safety aspects. Ink Testing

### References:

R.H. Leach, Printing Ink Manual, Kluwer Academic Publishers

**Course Outcomes**

The students of the course should be able to

CO 1: Describe nature of printing ink and different raw materials of printing and ink related printing problems. (K2)

CO2: Discuss different properties of different inks. (K2)

CO 3: Explain and illustrate different ink manufacturing processes and equipments. (K2)

CO 4: Demonstrate and explain different Ink Testing methods. (K3, K2)

CO 5: Compare and discuss different ink related problems and possible solutions (K4, A2)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | | | | | | | | | | | | |
| CO2 | 3 | 2 | 1 | | | | | | | | | | | | |
| CO 3 | 3 | 1 | 1 | | | | | | | | | | | | |
| CO4 | 1 | 3 | 2 | | | | | | | | | | | | |
| CO5 | 1 | 2 | 3 | | | | | | | | | | | 2 | |

## PRN/PC/B/T/225: GRAPHIC REPRODUCTION

### Module 1

Basic principles of reproduction camera. Overview of reproduction cameras, Contact printer, Enlarger, Layout of a darkroom, Camera lens, Depth of field, Hyper focal distance, Aperture & Iris diaphragm, Panchromatic, Orthochromatic, Blue sensitive films.

### Module 2

Process films, exposure, developer & their ingredients, development, film speed & sensitivity, Silver halide chemistry.

### Module 3

Basic sensitometry, Gamma, Characteristic curve, Densitometry, Digital photography and transmission scanner.

### Module 4

Colour separation, Halftone, Screen angles, Black printer, Colour filters, Colour correction.

**Course Outcomes**

The students of the course should be able to

CO 1: Define principles of reproduction camera, contact camera, enlarger (K1)

CO 2: Describe camera lens, film, developer, silver halide chemistry etc. (K2)

CO 3: Discuss characteristic curve, densitometry, digital photography etc. (K2)

CO 4: Illustrate colour separation and correction (K3)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 1 | | | | | | | | | | | | |
| **CO2** | 3 | 2 | 1 | | | | | | | | | | | | |
| **CO3** | 3 | 2 | 1 | | | | | | | | | | 1 | | |
| **CO4** | 2 | 3 | 1 | | | | | | | | | 2 | | 1 | |

**PRN/PC/B/CSE/T/226: MICROPROCESSOR**

**Module 1**

Introduction to microprocessors and microcomputers. Microprocessor architecture. Addressing modes.

**Module 2**

Instruction set; instruction cycle and state transition diagrams. Machine language and assembly language programming. Supervisory systems for microprocessors. Data transfer operations - programme controlled, synchronous, asynchronous and interrupt handling.

**Module 3**

Direct memory access.Interfacing devices for parallel and serial devices. Asynchronous and synchronous communications, DMA; interrupt controller, timer, etc.

**Module 4**

Applications of microprocessors, philosophy of microprocessors based system design with examples. System evaluation, development and debugging aids.

**Course Outcomes**

The students of the course should be able to

CO 1: Explain different components of microprocessor and microcomputers including architecture, instruction set, instruction cycle, state transition diagram, etc. (K2)

CO 2: Express different operations in terms of programming in machine language and assembly language (K2)

CO 3: Show the operational concepts of different microprocessor systems and devices like parallel and serial devices, interrupt controller, timer, asynchronous and synchronous communication systems, memory allocation mechanisms, etc. (K3)

CO 4: Analyze different possible applications of microprocessor based system andpoint out possible modifications upon assessing the system (K4)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | | | 1 | | | | | | | | 2 | | |
| **CO 2** | 3 | | 2 | | 1 | | | | | | | | 1 | | |
| **CO3** | | 2 | 3 | 1 | | | | | | | | | | 2 | |
| **CO4** | | 3 | | 2 | 1 | | | | | | | | | 1 | |

**PRN/PC/B/S/221: GRAPHIC REPRODUCTION LAB**

**Module 1**

1. Study of different darkroom equipments
2. Study of developing solution

**Module 2**

3. Procedure and handling the film, exposing, processing and drying
4. Preparation of line negative
5. Production of positives by contact printing

**Module 3**

6. Preparation of halftone
7. Preparation of continuous tone bromide photograph using Enlarger
8. Retouching

**Module 4**

9. Densitometric analysis
10. Digital reproduction photography
11. Digital inputting of transmission originals using transparency scanner

**Course Outcomes**

The students of the course should be able to

CO 1: Describe different darkroom equipments, developing solution etc.(K1, A1)

CO 2: Respond line negative and positives, halftone negative and positives (A2)

CO 3: Apply retouching, digital reproduction photography etc. (K3, A2)

CO 4: Analyze densitometric analysis of negatives and positives and digital inputting originals (K4, A2)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 1 | | | | | | | | | | 2 | | |
| **CO2** | 1 | | | | | | | | | | | 2 | 3 | 2 | |
| **CO3** | 1 | 2 | 3 | | | | | | | | | 2 | 2 | 2 | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO4** | 1 | 3 | 2 | | | | | | | | | 2 | 2 | 1 | |

## PRN/PC/B/CSE/S/222: MICROPROCESSOR LAB

To supplement the theoretical course on "Microprocessors"

**Course Outcomes**

The students of the course should be able to

CO 1: Relate and realize the machine language and assembly language programs for specific operationsusing different components of microprocessor kit (A1, K3)

CO 2: Observe the functionality of a microprocessor circuitry and test its performance (A1, K4)

CO 3: Manipulate the microprocessor functionality and examine the performance difference (A2, K3)

CO 4: Inspect and recognize the possible applications of microprocessor and microcomputer systems in printing and allied fields (A3, K4)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PO 11** | **PO 12** | **PSO 1** | **PSO 2** | **PSO 3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | | 2 | | 1 | | | | | | | | 2 | | |
| **CO 2** | 1 | 3 | | 2 | | | | | | | | | 1 | | |
| **CO3** | | 2 | 3 | 1 | | | | | | | | | | 2 | |
| **CO4** | | | 3 | | 2 | | | | 1 | | | | | 1 | |

## PRN/PC/B/S/223: PACKAGING LAB

**Module 1**

1.Pattern design of folding carton. 2. Folding carton design using AUTOCAD. 3. Die-cutting of folded carton.

**Module 2**

4. Testing of glass container. 5. Hydrostatic pressure testing of plastic container. 6. Impact resistance test of LDPE/HDPE film.

**Module 3**

7. Study of properties of different types of packaging materials like polymer films, foil, board, etc. 8. Use of lamination in packaging.9. Drop testing and vibration testing of the folding carton using accelerometer.

**Module 4**

10. Air and water permeability testing of packages. 11. Uses of hermetically sealing equipment. 12. Uses of filling machine, making of pouches, etc.

**Course Outcome**

The students of the course should be able to

CO1: Illustrate and design different folding cartons and their patterns (K2, K5)

CO2: Examine different type testing of paper board containers, glass containers, plastic containers etc. (K4, A5)

CO3: Analyse the performance of different packaging materials like paper, plastic, jute etc. (K4)

CO4: Review the working principle of different packaging machines. (K2)

**CO-PO Mapping: (3-strong, 2-moderate and 1-weak)**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 1 | | | | | | | | | 3 | 2 | 2 |
| **CO2** | 3 | 2 | 2 | 1 | | | | | | | | | 3 | 1 | |
| **CO3** | 3 | 2 | 2 | 1 | | | | | | | | | 1 | | |
| **CO4** | 3 | 2 | 1 | | | | | | | | | | 2 | | |

**Third Year First Semester**

**PRN/PC/B/T/311: OFFSET MACHINES**

**Module 1**

**Feeding:** Sheet transport in sheet fed offset machines: different types of feeding, feed board control, front lays and side lays, feed board detectors, different types of insertion systems, grippers, intermediate sheet transport.

**Printing Couples:** the plate cylinder, the blanket cylinder,and the impression cylinder, cylinder arrangement, cylinder bearers, cylinder gears, the inking system, ink flow, ink metering, ink distribution, pyramid design, roller setting, the dampening system, blanket fitting, packing, and blanket tension.

**Delivery systems:** Infrared drying, UV drying, and sheet delivery control.

**Module 2**

**The perfector Press:** Separate unit perfector press, Blanket-to-Blanket perfector press, and the Convertible press.

**Module 3**

**Press Lubrication:** Gravity-fed lubrication,continuous lubrication, intermittent lubrication, Cascade lubrication, and Grease-gum lubrication.

**Module 4**

**Trouble Shooting:** Paper problems, ink problems, plate problems, and print quality problems.

**References:**

Lithography, Ian Faux, Blue Print.
Printing Technology; Adams, Faux and Rieber,
Lithographers Manual, GATF

**Course Outcomes**

The students of the course should be able to

CO 1: Describe the different components of Sheetfed Offset Printing Machines (K2)

CO 2: Illustrate the different parts of Sheetfed Offset Presses (K2)

CO 3: Differentiate between the different types feeding mechanisms, insertion systems, inking systems, dampening systems, and perfecting presses. (K4)

CO 4: Solve the different problems related to Machines as well as Printing (K3)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 1 | | | | | | | | | | 2 | 2 | |
| **CO 2** | 3 | 2 | 1 | | | | | | | | | | 1 | 1 | |
| **CO3** | 1 | 1 | 2 | 3 | | | | | | | | | | | |
| **CO4** | 2 | 3 | | 1 | | | | | | | | | | | |

**PRN/PC/B/T/312: COLOR SCIENCE AND ENGINEERING**

**Module 1**

Fundamentals of Color, Importance of Definitions of color: Hue, Brightness and Lightness,Colorfulness and Saturation,

**Module 2**

Elementary Principles of Color, Elementary Principles of Color Reproduction, Color Measurement, Calculations of Tristimulus Values, Calculations of Selected Ordinates, Chromaticity Diagrams, CIE Color Spaces, Color-Difference Specification, Digitizing Color, Color Conversion and Separation, Tone Reproduction and Color Balance, SpectralSensitivities for Color Separation, ,

**Module 3**

Paper and Ink, Halftone dots- Murray-Davis and Yule- Nielson equations, Additivity and Proportionality of Densities, Mathematical Analysis of Color Correction, Neugebauer Equations,

**Module 4**

Four-Color Printing and the Black Printer, Color Management System, Color matching and mixing, Color proof

**References:**

John A. C. Yule, Principles of Color Reproduction: Applied to photomechanical reproduction, color photography, and the ink, paper, and other related industries , GATF * Phil

Green, Understanding Digital Color, GATF Press

**Course Outcome:**

The students of the course should be able to

CO1: Identify Basic attributes of color and quantify them to describe color

CO2: Measurement and appearance of color and tone reproduction

CO3: Mathematical and graphical analysis of color reproduction

CO4: Color management to incorporate device independence and print quality control

**CO-PO Mapping (3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | 3 | 1 | | | | | | | | 2 | 2 | |
| CO2 | 3 | 3 | 2 | 3 | 2 | | | | | | | | 2 | 2 | |
| CO3 | 3 | 3 | 2 | 3 | 2 | | | | | | | | 3 | 3 | |
| CO4 | 3 | 3 | 3 | 3 | 3 | | | | | | | | 3 | 3 | |

**PRN/PC/B/T/313: DIGITAL IMAGING**

**Module 1**

Introduction To Digital Imaging: Conventional vs digital images. Image capturing and outputting devices. Hardware and software interfaces.

**Module 2**

Digital Images: Vector and bitmap graphics. Graphics adapters. Digital Tone Reproduction Techniques: Digital half toning. Dithering. Grayscale images. Resolution and image quality. Image file formats and file exchange.

**Module 3**

Optical Scanning and Digitizing Techniques: Types of Scanner. Scanner anatomy; Scanner characteristics; Optical Character Recognition techniques; Bar Codes; Scanner feature;

Document imaging processor & it's recognition; CCD color Capture technique; image Enhancement technique; Image manipulation; Frame grabbing technique. Imagesetters and Platesetters: Mechanisms, calibration. Outputting.

**Module 4**

Raster Image Processor Technology (Rip): Raster: Glyph; Hardware & resolution dependency: Concept of BLIT; Stages of RIP; Imaging of a page, Data Compression/Decompression Technique: Character distribution; Character repetition; High usage pattern; Positional redundancy; Huffman coding; Run-length encoding; Programmed Compression; Adaptive Compression; Non-lossy Image Compression; Lossy Image Compression like JPEG, MPEG, Fractals group.

**References:**


Corrigan, J., Computer Graphics: Secrets and Solutions, BPB Publications, New Delhi.

Dougherty, Edward R &Giardina, Charles R., Image Processing-Continuous to Discrete, Vol.I: Geometric, Transform and Statistical Methods., Prentice Hall, NJ, USA

Eastman Kodak Co., TheColour Separation Scanner.

Giardina, Charles R. & Dougherty, Edward R., Morphological methods in image and signal processing, Prentice Hall, NJ, USA

Gonzalez, R.C. & Woods, R.E., Digital Image Processing, Pearson Education, Asia

Jensen, John R., Introductory Digital Imageprocessing: A Remote Sensing Perspective, Prentice Hall, NJ, USA.

Kang, Henry R., Digital Color Halftoning (SPIE PRESS Monograph Vol. PM68), SPIE--The International Society for Optical Engineering.

Lau, Daniel L. and Arce, Gonzalo R., Modern Digital Halftoning, Marcel Dekker.

Molla, Dr. R.K., Electronic Colour Separation, R.K.Printing and Publishing Co., West Virginia, USA

Pratt, William K., Digital Image Processing, John Wiley & Sons, Inc.

Sturge, J. & Walworth, V. &Shepp, A., Imaging Processes and Materials (Neblette's eighth edition), Van Nostrand Reinhold, NY, USA


**Course Outcome**

The students of the course should be to

CO1: Describe image capturing and outputting devices. (K1)

CO2: Explain dithering. (K6)

CO3: Discuss data compression and decompression technique. (K2)

CO4: Outline Huffman coding and run-length coding.

**CO-PO Mapping (3-Strong, 2-Moderate and 1 –Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | **3** | **2** | **1** | | | | | | | | | | **2** | |
| **CO 2** | **2** | **3** | **1** | | | | | | | | | **2** | | |
| **CO 3** | **2** | **3** | **1** | | | | | | | | | | | |
| **CO 4** | **2** | **3** | **1** | | | | | | | | | | | |

## PRN/PE/B/T/314A: PUBLICATION PRINTING

### Module 1

Standard and non-standard format of a book, copy preparation, Typography, Designing the text, Preparing illustrations, Preparing covers and jackets,

### Module 2

Typesetting the text, originating and making up the illustrations, Arranging for final films and CRC, Proofing the cover or jacket, Choosing and using paper,

### Module 3

Printing the book (printing processes and print quality control), Inks, Binding styles, Finishing operations, ISBN standards, Bar code, Organizing packing, Dispatch and distribution. Magazines: Definition, Types. Business plan for starting a magazine, Developing the magazine, Editorial concepts, Article editing, Selection of write-ups, photographs and arts,

### Module 4

Production planning, Wraps, Inserts and tip-ins, Different types of cover, Layout, Printing, Binding and finishing, Magazine circulation, Copyright act.

**Course Outcomes**

The students of the course should be able to

CO 1: Describe and illustrate format selection of a book to cover and jacket preparation. (K2,K3)

CO 2: Demonstrate book printing to finishing operations. (K3)

CO 3: Describe and illustrate ISBN standards, Bar code, Organizing packing, Dispatch and distribution of book.(K2,K2)

CO 4: Apply the concept in publication process and develop a cost optimized production (K3,K3)

**CO-PO Mapping (3 – Strong, 2 – Moderate, 1 – Weak)**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 1 | 3 | 2 | | | | | | | | | | | 2 | |
| **CO 2** | 3 | 2 | 1 | | | | | | | | | | | 1 | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO3** | 3 | 2 | 1 | | | | | | | | | | | 1 | |
| **CO4** | 3 | 2 | 1 | | | | | | | | | | | 2 | |

**PRN/PE/B/T/314B: ADVERTISING**

**Module 1**

Introduction to advertising: Advertising and other communication methods; Role of advertising in public relations.

**Module 2**

Types of advertising: Consumer product advertising; Industrial product advertising; Government advertising/ public service advertising; Financial advertising; Industrial or corporate advertising. Planning and Managing Advertising Campaign: Budgeting and campaign execution; copy testing; Evaluation of advertising.

**Module 3**

Advertising management: The publication advertising department; The Corporate advertising department; The advertising agency. Advertising Production: Copy concept, copy structure, essential of a copy, creative approaches and styles, copy testing criteria, types of copy testing, validity and reliability of copy test.

**Module 4**

Advertising design, layout, visualization, principles of advertising design, contribution of visual elements, what to picture, how to choose color, test of a good layout, production of print advertising.

**References:**

Rathore, B.S., Advertising Management, Animalaya Publishing, Howre.
Schiffman, Leon G. &Konark, Leslie Lajar, Consumer Behavior, Prentice Hall Inc.
Wright, John S.; Warner Daniel S.; Winter, Wills L.; Jr. &ZeiglcSharilyn K., Advertising, Tata McGraw-Hill Publishing Co. Ltd., New Delhi.

**Course Outcomes**

The students of the course should be able to

CO 1: Show the advertising management principles (K1)

CO2: Describe the different advertising aspects (K2)

CO3: Categorize the advertising campaigns against different advertising management parameters (K4)

CO 4: Recognize the advertising parameter requirements for a campaign (K5)

**CO-PO Mapping (3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | | | | | 1 | | | | 2 | | | 1 | | |
| **CO2** | 2 | 3 | | 1 | | | | | | | | | 1 | | |
| **CO3** | 1 | 3 | | 2 | | | | | | | | | | 1 | |
| **CO4** | | | 3 | | | 1 | | | | 2 | | | | | 1 |

## PRN/PC/B/T/315: FLEXO AND GRAVURE PRINTING

### Module 1

Flexographic principle, Flexographic printing surfaces and generation and their materials and processes. Inking system, Ink composition,

### Module 2

Flexographic presses, Floxographic printing problems.

### Module 3

Gravure principle, Gravure cylinder making processes and materials used, Gravure ink and their properties, Gravure presses, use of these processes in packaging industry, Trends and the future.

### Module 4

Gravure printing problems.

***Course Outcomes(CO)***

CO1: Describe the basic Flexographic principle and presses . (K2)
CO2: Describe various types of image carrier process for flexographic Printing , inking system and ink composition for flexographic Printing .(K2)
CO3: Analyze different troubleshooting related to flexographic Printing and Quality control systems. (K4)
CO 4: Describe the gravure principle (K2)
CO 5: Discuss gravure cylinder making processes and materials used, gravure ink and their properties, gravure presses, use of these processes in packaging industry (K2)
CO 6: Analyze gravure printing problems (K4)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | | 3 | | | | | | | | | | |
| CO2 | 3 | 2 | 2 | | 1 | 2 | | | | | | | | | |
| CO3 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | | | | 2 | 2 | | 3 | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO4 | 3 | 2 | 1 | | | | | | | | | 1 | | | |
| CO5 | 3 | 2 | 1 | | | | | | | | | 1 | | | |
| CO6 | 2 | 3 | 2 | | | | | | | | | 2 | | 2 | |

**PRN/PC/B/S/311: OFFSET MACHINES LAB**

**Module 1**

1.Study of drive system of offset machine (both mechanical and electrical). 2. Study of feeding unit of the sheet fed machine (including sheet separation, feed board control, registration, etc.). 3. Blanket fixing and adjustment, plate fixing, cylinder adjustment, impression pressure setting, etc.

**Module 2**

4. Roller setting (both inking and dampening systems), measurements of nip pressure, roller hardness, etc . 5. Measurements of surface temperature of rollers, and stresses induced in the rollers.

**Module 3**

6. Study of the delivery unit (including sheet control, gripper setting, bay setting). 7. Study of the control unit of offset machine. 8. Study of the lubrication system of offset machine.

**Module 4**

9. Study of the pneumatic system of offset machine. 10. Single colour printing and multicolour printing.

**Course Outcome**

CO1: Clarify the working principle of drive systems and main printing unit of offset machine through simple laboratory experimemts. (K2)
CO2: Discuss the working principles of feeding unit of offset machine. (K2)
CO3: Describe the mechanism of rollers movement in the inking and dampening system of offset machine. (K1)
CO4: Assess the mechanism and functions of delivery unit & control unit of multicolour offset machine. (K3)

**CO-PO Mapping (3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | | | | | | | | | | 2 | | |
| CO2 | 3 | 2 | 1 | | | | | | | | | | 2 | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO3** | 3 | 2 | 1 | | | | | | | | | | 2 | | |
| **CO4** | 3 | 2 | 1 | 1 | | | | | | | | | 2 | | |

**PRN/PC/B/S/312: COLOUR AND TONE REPRODUCTION LAB**

**Module 1**

1. Introduction to editing and retouching softwares like Photoshop

**Module 2**

2. Process Color separationusing color charts 3. Color adjustment of images and densitometric measurements 4. Tonal adjustment of Images and densitometric measurement: Tone Reproduction Curve analysis 5. Histogram analysis and equalization

**Module 3**

6.Gray Component Replacement and black separation 7.Unsharp masking and other masking, special effects 8. Color Management: calibration and characterization of monitor, scanner and digital camera

**Module 4**

9.Calibration and characterization of printer using Color Management profiling softwares 10.Integrating Color Management 11. Visual Color Evaluation

**References:**

Adams and Weisburg, GATF Practical Guide of Color Management, GATF
John A. C. Yule,Principles of Color Reproduction: Applied to photomechanical reproduction, color photography, and the ink, paper, and other related industries , GATF

**Course Outcomes:**

CO1: Basic color reproduction with UCR and GCR
CO2: Measurement of color and tone reproduction
CO3: Measurement of color difference
CO4:Calibration and characterization of devices for Color management to incorporate device independence and print quality control

**CO-PO Mapping (3 – Strong, 2 – Moderate, 1 – Weak)**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 3 | 1 | | | | | | | | 3 | 3 | |
| **CO2** | 3 | 3 | 2 | 3 | 2 | | | | | | | | 3 | 3 | |
| **CO3** | 3 | 3 | 2 | 3 | 2 | | | | | | | | 3 | 3 | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO4** | 3 | 3 | 2 | 3 | 3 | | | | | | | | 3 | 3 | |

**PRN/PC/B/S/313: DIGITAL IMAGING LAB**

**Module 1**

1. An introduction to digital imaging environments: Equipment and softwares used.

**Module 2**

2. Vector and bitmap graphics. 3. Digital tone reproduction techniques. 4. Inputting and analyzing reflection and transmission originals through flatbed scanner. 5. Inputting and analyzing images through digital camera.

**Module 3**

6. Image file formats and file exchange. 7. Optical character recognition systems. 8. Programming in Page Description Languages to various output devices for imaging control. 9. Imaging through computer to film/plate systems.

**Module 4**

10. Optical and other controls in scanner and digital camera.

**Course Outcome**

The students of the course should be to

CO1: Experiment with image acquisition and outputting devices. (K3,A2)

CO2: Discuss various types of graphics. (K2)

CO3: Analyze and input through digital camera and flatbed scanner. (K4)

CO4: Outline Programming through Page description languages . (K4)

**CO-PO Mapping (3-Strong, 2-Moderate and 1 –Weak)**

| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PO 11** | **PO 12** | **PSO 1** | **PSO 2** | **PSO 3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | 3 | 2 | 1 | | | | | | | | | | 3 | | |
| **CO 2** | 2 | 3 | 1 | | | | | | | | | | 3 | | |
| **CO 3** | 2 | 3 | 1 | | | | | | | | | | 3 | | |
| **CO 4** | 2 | 3 | 1 | | | | | | | | | | 3 | | |

**PRN/PC/B/S/314: FLEXO AND GRAVURE LAB**

**Module 1**

1. Preparation of flexographic stereo 2. Preparation of Gravure cylinder

## Module 2

3.Study of different parts of the flexographic machine 4.Study of different parts of the gravure machine

## Module 3

5.Setting different parts of the machines 6.Printing on different types of substrate

## Module 4

7. Study of different running on problems and trouble shooting 8. Machine maintenance

**Course Outcomes:**

CO1: Experiment the basic principle of flexo and gravure on monocolar machine(K3, A2)
CO2:Describing different elements of flexo and gravure printing machines (K2,K5)
CO3: Identify different problems related to flexo and gravure printing and Solving different problems and challenges in flexo and gravure printing process (K3,K4,S4)
CO4: Evaluate different quality Parameters in package printing. (K1)
CO5: Develop a comprehensive idea on data collection, analysis and presentation.( K3,A3,A4,S3)
CO6: Evaluate different types of maintenance and safety in flexo and gravure industry (K4)

## CO-PO Mapping (3-Strong, 2-Moderate and 1 –Weak)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 | | | | | | | | | | | |
| **CO2** | 3 | 2 | 2 | | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | | | |
| **CO3** | 3 | 1 | 2 | | | 2 | 2 | | 3 | 3 | 3 | 3 | | 2 | |
| **CO4** | 3 | 1 | 1 | | | 2 | 2 | | 3 | 3 | 3 | 3 | | | |
| **CO5** | 3 | 1 | 1 | | | 2 | 2 | | | | | | | | |
| **CO6** | 3 | 1 | 1 | | | 2 | 2 | | | | | | | | |

## PRN/PS/B/S/315: MINI PROJECT (DIGITAL CONTENT DEVELOPMENT LAB)

## Module 1

Creation of static and dynamic digital contents for digital publishing media using design and layout tools

## Course Outcomes

The students of the course should be able to

CO 1: Estimate the technical requirement and build the required elements of digital publishing (K2, S2)
CO 2: Examine the digital components of required content technically and reproduce the elements complying the media requirements (K3, S1)
CO 3: Employ different tools to develop the digital content(K3, A4)
CO 4: Evaluate the different options and tools to choose the best applicable ones for a particular digital content requirement(K6, A3)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 3 | 1 | | | | | | | | | | 2 | | |
| **CO 2** | 2 | 3 | 1 | | | | | | | | | | 1 | | |
| **CO3** | | | 2 | | 3 | | | | 1 | | | | | 2 | |
| **CO4** | | 3 | | 2 | | | | | | 1 | | | | 1 | |

## Third Year Second Semester

### PRN/PC/B/T/321: POST PRESS OPERATIONS

**Module 1**

Review of Print processes, colour planning, Paper grain direction and its importance in planning, Imposition techniques, Introduction to Folding machines, Different folds and their selection, Knife folders and its settings, Buckle folders, Feeders exclusively for folding machines,

**Module 2**

Problems and calculations on folding, Cutting and Trimming, Significance of planning for converting customer specification to finished material,

**Module 3**

Conditions and limitations of a planner, Planning for web machines,

**Module 4**

Introduction to Binding, Saddle-stitch binding and its use, Smyth sewing and its specifications, different Side stitches, Perfect binding & Spiral binding, Adhesive binding, Problem exercises on binding, Hard cover binding, Styles on Hard cover, Decorative works like Foil stamping, Gold-lining, etc.

**References:**

Binding and Finishing,; Geoff Potter, Blue Print
Printing Technology; Adams, Faux and Rieber
Lithographers Manual, GATF

**Course Outcomes**

The students of the course should be able to

CO 1: Describe the different Imposition Schemes with relation to planning of Print (K1)

CO 2: Illustrate the different types of folding scheme and Folding Machines (K2)

CO 3: Discuss the different stitching, sewing and binding techniques used in Printing Industry (K2)

CO 4: Analyze the different Problems related to Job Planning, binding and finishing processes (K4)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 1 | | | | | | | | | | 2 | 2 | |
| **CO 2** | 2 | 3 | 1 | | | | | | | | | | 1 | 1 | |
| **CO3** | 3 | 2 | 1 | | | | | | | | | | | | |
| **CO4** | 1 | 2 | 3 | | | | | | | | | | | | |

**PRN/PC/B/T/CSE/322: DATABASE MANAGEMENT SYSTEM**

**Module 1**

Linear lists-arrays, linked lists, stacks and queues. Trees - binary trees, binary search trees, multiway trees. Graphs.Strings. Searching and sorting techniques.

**Module 2**

File structures - sequential,relative, indexed - sequential, direct.

**Module 3**

Broad introduction to database management systems and the design, implementation and applications of databases. Topics include an overview of DBMS architectures; concepts and implementations of the rotational models; SQL; database design and modelling techniques, and issue such as recovery, concurrency, physical implementation concerns and performance and management aspects.

**Module 4**

Alternative approaches to design database systems (for example object oriented or extended relational systems); distributed databases; database machines; and database interfaces and languages.

**Course Outcome:**

The students of the course should be able to

CO1:Define the various elements of database and related topics(K1)

CO2: Discuss the basics of Database management systems including design, implementation and applications(K2)

CO3:Apply Database management concept to design, model, performance and management of databases.(K3)

CO4: Describe alternative approaches to design database systems; distributed databases; database machines; and database interfaces and languages.(K2)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 1 | | | | | | | | | | | | |
| **CO 2** | 3 | 2 | 1 | | | | | | | | | | | | |
| **CO3** | 3 | 2 | 1 | | | | | | | | | | | | |
| **CO4** | 3 | 2 | 1 | | | | | | | | | | | | |

**PRN/PC/B/T/323: ESTIMATING AND COSTING**

**Module 1**

Definition of estimation and costing and their relationship, Different costing methods, Determination of direct and indirect cost of a printing job.

**Module 2**

Budgeting, Establishment of budget centers, Cost of productive department, Budgeted hour cost rates, Job specifications, Estimation form,

**Module 3**

Estimating paper, ink, film and other chemicals.

**Module 4**

Depreciation, Working capital, Expense control and budgetary control.

References : * Ruggles Philip Kent, Printing Estimating, Delmar Publishers. * Adams J. Michael, Faux D. David, Rieber J. Lloyd, Printing Technology, Delmar Publishers

**Course Outcomes**

The students of the course should be able to

CO 1: Define estimation and costing, direct and indirect cost, depreciation (K1)

CO 2: Describe job specifications, estimation form, MIS etc. (K2)

CO 3: Estimate paper, ink, film and other chemicals (K2)

CO 4: Calculate budgeted hour cost rates, the cost of a printing job etc. (K3)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 1 | | | | | | | | | 1 | | | |
| **CO2** | 3 | 2 | 1 | | | | | | | | | 1 | | | |
| **CO3** | 3 | 2 | 1 | | | | | | | | | 1 | | 2 | |
| **CO4** | 2 | 3 | 1 | | | | | | | | | 2 | | 2 | |

**PRN/Honours/H/T/324: MULTIMEDIA COMMUNICATION**

**Module 1**

Introduction, multimedia information representation, stages of multimedia production, multimedia networks, multimedia applications, media types, communication modes, network types. Demonstratecompetencies in the use of a widely used multimedia authoring tool e.g. Macromedia Flash; evaluate the issues involved in multimedia delivery on the World Wide Web, Use a multimedia scriptinglanguage to add further interactivity to their applications,Hardware requirements, Software requirements.

1. Introduction, digital principles, text, images, audio, video, file formats.
2. Introduction, types of text, Images in multimedia, digital imaging, image editing, compression principles: text compression, and image compression. Introduction to oops, applying object design to animation process, interactive devices, Visual display systems, types of monitors.

**Module 2**

3. Latest developments in multimedia, audio, video, television graphics, animated television graphics, collaboration of different media such as audio, video & animation, streaming media, interactivity, recording , editing softwares, compression techniques, Multimedia designing and authoring.

**Module 3**

4. The internet, Introduction, LANs, Ethernet, Token ring, Bridges, FDDI High-speed LANs, LAN protocol. Internet addresses, IP addresses, protocol and layering.

**Module 4**

5. Future of multimedia, Electronic media production, Web basics, web publishing, Programming languages such as HTML, DHTML, XML for web page creation, Browser and security, search engines, bookmarks.

**References:**

R. Parekh, "Principles of Multimedia", 2/e, Tata McGraw Hill, 2012.

Jessica Keyes, Multimedia Handbook, McGraw Hill Publication, 1994
Fred Halsall, "Multimedia Communications : Applications, Networks, Protocols and Standards", Pearson Education Ltd., 2001.
Francois Fluckiger, "Understanding Networked Multimedia : Applications and Technology", Prentice Hall, 1995.
Ralf Steinmetz and N Jersey, "Multimedia: computing, communications and applications", PHI, 1995
William Stallings, Data and Computer Communications, Pearson Prentice Hall, 5th edition.
Andrew .S. Tannenbaum, Computer Network, Prentice Hall PTR, 2002.
Kamal Raj, "Internet and web technologies", Tata McGraw Hill publishing Company Ltd. New Delhi, 2002

**Course Outcomes**

The students of the course should be able to

CO1: Understanding the multimedia communications systems, application and basic principles.( K2)
CO2: Analysis of the multimedia streaming.(K4)
CO3: Performing and establishing multimedia communication terminals. (K5)
CO4: Presentation of multimedia communications.(K1)
CO5: Describe the development process of the multimedia systems.(K2)

**CO-PO Mapping: (3 – Strong, 2 – Moderate and 1 – Weak)**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 | 3 | | | | | | | | | | |
| **CO2** | 3 | 2 | 2 | | 3 | 2 | 2 | | 3 | 3 | 3 | 3 | | | |
| **CO3** | 3 | 1 | 2 | 1 | 3 | 1 | 2 | | 3 | 3 | 3 | 3 | | 2 | |
| **CO4** | 3 | 1 | 1 | 1 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | | | |
| **CO5** | 3 | 1 | | | 3 | | | | | | | | | 2 | |

**PRN/Honours/H/T/325: IMAGING TECHNOLOGY**

**Module 1**

Overview of optical imaging: domains of image science. Electromagnetic waves and rays, Basics of signal processing. Fourier analysis in two dimensions. Linear systems. Two-dimensional samplingtheory: the Whittaker-Shannon theorem, Diffraction. The Rayleigh-Sommerfeld formulation of diffraction. Fresnel and Fraunhofer approximations, Fundamentals of wave scattering, Diffractionlimitedimaging. Image formation with coherent

and incoherent illumination.Analysis of opticalresolution, Frequency analysis of optical imaging systems.Frequency response for diffractionlimitedoptical systems: coherent and incoherent imaging. Optical transfer function (OTF),modulation transfer function (MTF) and phase transfer function (PTF): characterization andmeasures, Aberrated imaging systems. Generalized pupil function. Apodization.Image quality inaberrated systems, Fundamental of wavefront modulation.Spatial light modulators. Diffractiveoptical elements, Spatial filtering. The VanderLugt filter. The Joint Transform Correlator. Opticalpattern recognition architectures: the Matched Filter. Image processing tools for pattern recognition, Optical image restoration. Optical Transfer Function for image motion and vibration. Effects ofatmospheric blur and target acquisition.

**Module 2**

Light fundamentals: brief review of radiometry and photometry. Luminous efficiency. Color temperature. Color rendering index, Light sources: incandescent light bulbs. High-intensitydischarge lamps.Xenon arc lamps.Flash lamps, Fluorescent lamps.Inductive lighting.LED andOLED.Laser, photometric curves.CIE illuminants and standard sources.Types of reflection andtransmission.Filtering.Polarization. Lighting geometry, Lighting in machine vision: commonlighting techniques. Structured lighting.Color lighting. Lighting products dedicated to machine
vision. Examples of applications.

**Module 3**

Photodetectors. Applications in photometric and colorimetric instrumentation, Color scanners,Displays, Scientific electronic cameras, Digital still cameras and video cameras.
Charge-Coupled Device (CCD): linear and array architectures. Charge transfer.Progressive scan.Time delay and integration. CCD performance, CMOS sensor: linear and array architectures. Designvariants. CMOS performance, Color cameras: linear and array architectures. Bayer mask. RGBEfilter. Dichroic beam splitter prism, Foveon X3 sensor.Multispectral devices.

**Module 4**

Optical holography. Recording and reconstructing thick holograms. Digital holography.Holographicdata storage.Holographic interferometry.Speckle and applications.

**References:**

Light: science and magic: an Introduction to photographic lighting, Fil Hunter, Steven Biver and PaulFuqua, Focal Press, 2007.
Handbook of machine vision, Alexander Hornberg, Wiley-VCH, 2006.
CCD arrays, cameras, and displays, Gerald C. Holst, SPIE Optical Engineering Press, 1996.
Light and light sources: High-Intensity Discharge lamps, Peter Flesh, Springer, 2006.
Solid-state imaging with Charge-Coupled Devices, Albert J.P. Theuwissen, Kluwer AcademicPublishers, 1996.
Goodman, J.W., “Introduction to Fourier Optics”, 2nd Ed. McGraw-Hill (New York, 1996).
VanderLugt, A., "Optical Signal Processing", Ed. John Wiley & Sons, 1992.

Hariharan, P. "Optical holography. Principles, Techniques and Applications", Cambridge Studies inModern Optics, Cambridge University Press, New York, 1996.
T. M. Kreis, Handbook of Holographic Interferometry, Optical and Digital Methods. Berlin: Wiley-VCH,2005.
Hunt, R.W.G., "The Reproduction of Colour ", 6th Ed. John Wiley & Sons, 2004.
Bass, M., "Handbook of Optics, Vol. 1 Fundamentals, Techniques and Design", 2nd Ed. Optical Society ofAmerica, 1995.
Berns, R.S., "Billmeyer and Saltman's Principles of Color Technology", 3rd Ed. John Wiley & Sons, 2000.
Chirigov, V. G., "Liquid Crystal Devices. Physics and Applications", Artech House, 1999.
Holst, G. C., "Electro-Optical Imaging System Performance", 4th Ed. JCD Publishing and SPIE OpticalEngineering Press, 2006.
Holst, G. C., Lomheim, T. S., "CMOS/CCD Sensors and Camera Systems", JCD Publishing and SPIE Press,2007.
Sproson, W. N., "Colour Science in Television and Display Systems", Ed. Adam Hilger, 1983.
Yadid-Pecht, O., Etienne-Cummings, R. (Eds.), "CMOS Imagers: From Phototransduction to ImageProcessing", Kluwer Academic Publishers, 2004.

**Course Outcomes**

The students of the course should be to

CO1: Analyze optical imaging and basics of signal processing(K4)

CO2: Discuss radiometry and photometry in brief. (K2)

CO3: Explain photodetector in details. (K5)

CO4: Discuss holography. (K2)

**CO-PO Mapping (3-Strong, 2-Moderate and 1 –Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | 3 | 2 | 1 | | | | | | | | | | 3 | | |
| **CO 2** | 2 | 3 | 1 | | | | | | | | | | | | |
| **CO 3** | 2 | 3 | 1 | | | | | | | | | | 1 | | |
| **CO 4** | 2 | 3 | 1 | | | | | | | | | | 1 | | |

**PRN/PC/B/ CSE/S/ 321: DBMS LAB**

**Module 1**

Experiments on Linear lists-arrays, linked lists, stacks and queues. Trees.

Experiments on

Database Schema, Keys;

**Module 2**

Basic structure of SQL queries, Creation of a database and writing SQL queries to retrieve information from the database. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions. SQL Data Types and Schemas,

**Module 3**

Database Querying – Simple queries , Nested queries, Sub queries and Joins, Views, Sequences, Synonyms.

**Module 4**

Alternative approaches to design database systems (for example object oriented or extended relational systems or introduction to other database); distributed databases;

**Course Outcome:**

CO1 - To develop conceptual understanding of database management system (K2)

CO2- To understand design and implementation of typical database applications (K2)

CO3-Critically analyze the use of Tables, Views, Functions and Procedures(K2, K4)

CO4- To understand how a real world problem can be mapped to schemas (K2)

CO5- To solve different industry level problems & to learn its applications (K3)

**CO-PO Mapping (3-Strong, 2-Moderate and 1 –Weak)**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | 1 | 3 | | 1 | 2 | 3 | | 2 | 3 | 2 | 2 | 2 |
| CO2 | 3 | 1 | 1 | 1 | 3 | 2 | 1 | 2 | 3 | | 2 | 3 | 2 | | |
| CO3 | 3 | 2 | 1 | 1 | 3 | 1 | 1 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 2 |
| CO4 | 3 | 2 | 1 | 2 | 3 | | 2 | 2 | 3 | 2 | 3 | 3 | | 2 | |
| CO5 | 3 | 2 | 1 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 2 |

**PRN/PC/B/S/322: POST PRESS LAB**

**Module 1**

1. Imposition scheme: Half-sheet works. 2. Imposition scheme: Sheet works.

## Module 2

3. Cutting and trimming. 4. Wire stitching. 5. Sewing

## Module 3

6. Spiral binding. 7. Comb binding. 8. Adhesive binding

## Module 4

9. Laminating 10. Case binding

**Course Outcomes**

The students of the course should be able to

CO1: Classify and prepare the imposition scheme for different printing job complying the requirements(K2, K3, A2)

CO2: Prepare and compare the different types of Stitching and binding methods (K3, K4)

CO3: Demonstrate the different types of Mechanical Binding Systems(S3)

CO4: Adapt with the Adhesive Binding Operationsc(A3)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 1 | | | | | | | | | | 2 | 1 | |
| **CO2** | 1 | 2 | 1 | | | | | | | | | | 3 | 1 | |
| **CO3** | 1 | 2 | 1 | | | | | | | | | | 3 | 1 | |
| **CO4** | 1 | 2 | 1 | | | | | | | | | | 3 | 2 | |

## PRN/PS/B/S/323: MINI PROJECT (WEB DESIGN)

## Module 1

Introduction to web technology, Client and server scripting language,

## Module 2

HTML, XML, CSS, Java Scripts, Using of Multimedia software tool,

**Module 3**

Web publishing, Website Creation, Network.

**Course Outcome:**

The students of the course should be to
CO1: Classify web design languages. (K2)
CO2: Discuss the advantages of HTML. (K2)
CO3: Distinguish between HTML and XML (K4)
CO4: Discuss the advantages of webpublishing (K2)

**CO-PO Mapping (3-Strong, 2-Moderate and 1 –Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | 3 | 2 | 1 | | | | | | | | | | 1 | | |
| **CO 2** | 3 | 2 | 1 | | | | | | | | | | 2 | | 1 |
| **CO 3** | 3 | 2 | 1 | | | | | | | | | | 2 | | 1 |
| **CO 4** | 3 | 2 | 1 | | | | | | | | | | 3 | | 3 |

## Fourth Year First Semester

### PRN/OE/B/T/411: ELECTRONIC PUBLISHING SYSTEM (OPEN ELECTIVE)

**Module 1**

Fundamental of Publishing: Computer assisted Publishing; Electronic Publishing; Database Publishing; Web publishing Readability & Legibility of text on screen & paper regarding Character, Formatting, Color & Contrast, Dynamic text presentation.

**Module 2**

Page Construction: Concepts of BOX & GLUES; Rules for breaking paragraph into lines; List of lines into pages; Basic principle of justification and Hyphenation procedures; Typographic markup languages as publishing standards like ASPIC, SGML system, other extension of SGML like html, xml, Javascript.

**Module 3**

Document Development System: Direct Manipulation interfaces; Source language model; Task domain like Direct manipulation graphics editing, Graphics programming, Formatting & layout, Pre & Post processing, Imaging Files and interchanges, Annotations/ Narration & dynamic reading; Basic structure of a document development system and its application in the latest document imaging software.

Styles In Document Editing System: Static functionality & Dynamic functionality; Styles; Style rules; Style design issue; Document structure like Consistency of style, Caption Selection of fonts, Heading & Subheading with text matter; house style.

**Module 4**

Publishing Management System: Publication representation; Publication environments; Publication node structure; Version management; Content objects & processing objects; Publication naming; Information sharing Hypertext and its principle.

Electronic publishing formats: Postscript: pdf, epub, lit etc Multimedia System: Application of multimedia in web publishing. Multimedia tools. Multimedia presentation and editing.

**References:**

Card, M., Interfacing wordprocessors and phototypesetters, Blueprint, London.

Goldfarb, Charles F & Rubinsky, Yuri (Contributor) The SGML Handbook, Clarendon Pr

Musciano, C. & Kennedy, B., HTML and XHTML: The Definitive Guide, Shroff Publishers & Distributors Pvt. Ltd., Kolkata

Steinmetz, Ralf & Nahrstedt, Klara, Multimedia: Computing, Communications, and applications, Pearson Education, Asia.

**Course Outcome:**

The students of the course should be to

CO1: Discuss various type of publishing. (K2)

CO2: Discuss the typographic mark up languages (K2)

CO3: Discuss on publishing management systems (K2)

CO4: Discuss the advantages of electronic publishing system (K2)

**CO-PO Mapping (3-Strong, 2-Moderate and 1 –Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | 3 | 2 | 1 | | | | | | | | | | 1 | | |
| **CO 2** | 3 | 2 | 1 | | | | | | | | | | 2 | | 1 |
| **CO 3** | 3 | 2 | 1 | | | | | | | | | | 2 | | 1 |
| **CO 4** | 3 | 2 | 1 | | | | | | | | | | 3 | | 3 |

**PRN/PC/B/T/412: NEWSPAPER PRINTING TECHNIQUES**

**Module 1**

Work flow of a news paper house, Front-End Systems: Collection of text, pictures and graphics into the computer, pagination systems, colour systems, library systems (storage). Introduction to telecommunications,

**Module 2**
Output devices: PTS, Laser printer, Image setter, and CTP.

**Module 3**
Web Offset Machines: Basic configuration of web offset presses, different types of reel stand and their elements, web tension control, web detector devices, web turner, web registration control, different types of web folder and ancillary systems such as mail room delivery, bundling, etc.

**Module 4**
Handling of printing materials in news paper house.

**References:**
Latest developments in newspaper technology, PIRA.
Advances in Web Offset, PIRA.
Web Offset Operating, GATF.
Printing Technology, Adams, Faux and Rieber.

**Course Outcomes**
The students of the course should be able to
CO 1: Describe the basics of Newspaper production including workflow, data processing, data transmission, etc (K2)
CO 2: Illustrate the different input and output devices used in the prepress area (K2)
CO 3: Illustrate the different types of web offset presses along with different components used in Newspaper printing (K3)
CO 4: Solve the different printing related troubles in newspaper production (K3)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | | | | | | | | | | 2 | 2 | |
| CO 2 | 3 | 2 | 1 | | | | | | | | | | 1 | 1 | |
| CO3 | 1 | 1 | 2 | | | | | | | | | | | | |
| CO4 | 2 | 3 | 1 | 1 | | | | | | | | | | | |

**PRN/HS/B/T/413: INDUSTRIAL MANAGEMENT**

**Module 1**

Introduction to management problem, types of manufacture, planning, analysis and control aspects in industries. Types of business ownerships, means of financing and business combinations.

**Module 2**

Organisation structures.committee, authority, responsibility, duty and span ofcontrol. Plant location, building and physical facilities.Plant layout, machineries and materials.Product development and standarisation.Production planning and control, production forecasting and scheduling; network techniques. Gantt chart, CPM, PERT etc. Workstudy, job evaluation and merit rating. Purchase system and inventory control.

**Module 3**

Maintenance and replacement policies for machines and equipment.Decision making theories. Break even analysis; cost benefit analysis, evaluation of financial and managerial efficiencies. introduction to operation research techniques. Industrial humanics and labour compensation.Personnel management provisions of industrial legislations in India; wage, salary. Welfare; safety provisions and trade union acts. Marketing as an intergrative discipline; Market planning (theory X and Y). Methods of market segmentations, Introduction to reasons of buying and effects on market strategies. Consumer Vs. Industrial marketing. Suitable use of market research in printing industries.Management techniques and abilities; General management analysis and decision making. Corporate planning and control: corporate objectives, planning, organisations and applications. Analysis of companies in the printing and packaging industries. Change of company policy with change of technology. Reproduction work, approval and modification of design; drawing of material schedule. Production planning; routing, interrelation of routing; route sheets; master schedule, machine loads and load charts.

**Module 4**

Laws, rules and regulations.Contracts of different nature.Effect on packaging on marketing. Understanding the relationship between marketing and the industries. Market planning, understanding the market, the consumer and the market, marketing processes, the concept of marketing mix, new product development, distribution, productionalmix, sales promotion, selling, pricing.

**Course Outcomes:**

CO1: Classify various principles and functions of management. (K2)

CO2: Solve different problems related to management of production planning and control systems. (K3)

CO3: Apply various optimization tools to solve general production management problems. (K3)
CO4: Analyze the fundamental management concepts in some advanced manufacturing systems. (K4)
CO5: Illustrate different aspects of marketing and sales promotion. (K3)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | | |

**PRN/PC/B/CSE/T/414: DATA COMMUNICATION AND NETWORKING**

**Module 1**
Introduction to the concepts and principles of computer networks.

**Module 2**
The nature of communications media and signaling methods, analog and digital transmission; data link protocols, protocol proof techniques;

**Module 3**
Routing, broadcasting, multicasting; connection, disconnection and crash recovery protocols; internetworking

**Module 4**
Security; and network analysis and design using graph theory and queuing theory.

**Course Outcomes:**
The students should be able to
CO1: Discuss the fundamentals of computer network (K2)
CO2: Describe and illustrate the various network topologies and the functionalities of the physical layer.(K2,K2)
CO3: Explain and analyse the data link layer protocols (K2,K4)
CO4: Discuss and describe the media access control protocols (K2,K2)
CO5: Demonstrate and analyse different routing protocols and network protocols (K3,K4)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | | | | | | | | | | | | |
| CO 2 | 3 | 2 | 1 | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO3** | 3 | 2 | 1 | | | | | | | | | | | | |
| **CO4** | 3 | 2 | 1 | | | | | | | | | | | | |
| **CO5** | 3 | 2 | 1 | | | | | | | | | | | | |

**PRN/Honours/H/T/415: PACKAGE PRINTING**

**Module 1**

Fundamentals of Packaging, Functions of the package,

**Module 2**

Different types of package, Package design, Packaging materials and how they are printed, Uses of different printing processes,

**Module 3**

Quality control in packages, Package inks and their properties, Finishing operations, Bar codes, Holograms, Troubleshooting,

**Module 4**

Packaging Laws and Regulation, recycling of packaging, Latest Trends and the future.

**Reference:**

Eldred Nelson R., Package Printing, Jelmar Publishing Co., Inc., NY.
Aaron L. Brody and Kenneth S. Marsh, "The Wiley Encyclopedia of Packaging Technology", 1997

**Course Outcomes:**

The students should be able to

CO1: To introduce the need and importance of packaging .(K2)

CO2: To impart knowledge about types of packaging, packaging materials, Process and machineries.(K2,K4)

CO3: To provide an overview about the finishing processes and Laws.(K2)

CO4: To understand the quality control in package printing.(K2)

**CO-PO Mapping: (3 – Strong, 2 – Moderate and 1 – Weak)**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **3** | **3** | **2** | **3** | | | | | | | | | | |
| **CO2** | **3** | **2** | **3** | **2** | **3** | **2** | **2** | | **3** | **3** | **3** | **3** | | | |
| **CO3** | **3** | **1** | **2** | **2** | **3** | **3** | **2** | | **3** | **3** | **3** | **3** | | **2** | |
| **CO4** | **3** | **1** | **3** | **3** | **3** | **2** | **2** | **2** | **3** | **3** | **3** | **3** | | | |

**PRN/Honours/H/T/416: WORKFLOW MANAGEMENT**

**Module 1**

Introduction, need and brief history of workflow management systems in printing industry and graphics communication

Components of workflow management system

**Module 2**

Data exchange models – XML based communication using JDF and JMF

Working model of JDF based ERP

**Module 3**

CIPM model and functions – CIP4 model1CRM and MIS module of print ERP

Networking architecture of workflow system

**Module 4**

Personalized print services and PPML

Web proofing

**Reference:**

JDF Workflow: A Guide to Automation in the Graphic Communications Industry, Thomas Hoffmann-Walebeck, Sebastian Riegel, Printing Industries Press, ISBN 0883627183, 9780883627181

JDF: Process Integration, Technology, Product Description, Wolfgang Kühn, Martin Grell, Springer Science & Business Media, 2006, ISBN 3540275282, 9783540275282

SPIE Proceedings on Electronic Imaging

Proceedings of the Technical Association of the Graphic Arts, TAGA

Print and Paper Monthly, Whitmar Publications Ltd., ISSN:1746-7179

IPA Bulletin, Involvement and Participation Association, ISSN:1472-5363

Graphic Arts Monthly,Cahners Pub. Co., ISSN:1047-9325

**Course Outcomes**

The students of the course should be able to

CO 1: Describe different components and modules of workflow systems (K2)

CO 2: Show the different communication models of workflow systems like CIP4/JDF, JMF, etc. (K3)

CO 3: Illustrate the architectural model of different workflow systems (K4)

CO 4: Explain the scope of personalization in print production system (K5)

**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO | PO | PO | PO | PO | PO | PO | PO | PO | PO | PO | PO | PSO | PSO | PSO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | 3 | | 2 | | 1 | | | | | | | | 2 | | |
| **CO 2** | | | | | 3 | | | | | 2 | 1 | | 1 | | |
| **CO 3** | | | | | 3 | | | | | 2 | 1 | | | 2 | |
| **CO 4** | | | | | 2 | | | | | | 3 | 1 | | | 1 |

## PRN/PS/B/S/411: SEMINER

Student seminar on printing and related topics

**Course Outcomes**

The students of the course should be able to

CO1. Present topic in current trends of printing and allied engineering domain (A2)

CO2. Summarise technical understanding in the form of report the engineering topics (K5, S5)

CO3. Defend the report of their work before a technical forum (K6, A5)

CO4. Adapt themselves to an interactive technical audience of seminar/conference/corporate environment (A4)

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | 1 | 2 | | | | 2 | 2 | | | | 2 | 3 | | | 1 |
| **CO 2** | 1 | 2 | | | | 2 | 2 | | | 3 | 2 | | | | 1 |
| **CO 3** | | 2 | | | 1 | 2 | 2 | 2 | | 3 | 2 | | | | |
| **CO 4** | | 2 | | | | 2 | 2 | | 3 | | 2 | | | | 1 |

## PRN/PS/B/S/412: PROJECT – I

Topic of project to be selected jointly by the assigned teacher and the student. A typed project report in duplicate is due at the end of the semester.

**Course Outcomes:**

The students of the course should be able to

CO1. Organize the planning and execution of a proposed engineering project (K4, A5)

CO2. Compile a scientific document summarizing the knowledge generated (K5, A5)

CO3. Create an engineering data base / design/ advanced knowledge (K6)

CO4. Display grasp of the chosen topic (A5)

## CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 3 | | | | | | 1 | 2 | | | 1 | | | |
| **CO 2** | 2 | 2 | | | 1 | | | | 2 | 3 | | | | 2 | |
| **CO3** | 2 | 2 | 3 | | 2 | | | | 2 | | | | 2 | 2 | |
| **CO4** | 2 | 1 | 2 | 3 | | | | | | 1 | | 1 | 2 | | |

**PRN/PC/B/S/413: WEB OFFSET LAB**

**Module 1**

1. Study of drive system of web offset machine (both mechanical and electrical). 2. Study of feeding unit of the web fed machine (including web tension, web path etc.). 3. Blanket fixing and adjustment, plate fixing, cylinder adjustment, impression pressure setting, etc.

**Module 2**

4. Roller setting (both inking and dampening systems), measurements of nip pressure, roller hardness, etc . 5. Measurements of surface temperature of rollers, and stresses induced in the rollers. 6. Study of the delivery unit (including folder unit).

**Module 3**

7. Study of the control unit of offset machine. 8. Study of the lubrication system of offset machine. 9. Study of the pneumatic system of offset machine.

**Module 4**

10. Single colour printing and multicolour printing.

**Course Outcomes**

CO1: Experiment the basic principle of web offset on monocolor machine (K3, A2)
CO2: Describing different units of web offset printing machines (K2, K5)
CO3: Describe the inking and dampening system to understand the roller setting. (K2)
CO4: Identify different problems related to web offset printing and solving different problems
and challenges in web offset process (K3,K4,S4)
CO5: Develop a comprehensive idea on data collection, analysis and presentation.
(K3, A3, A4, S3)
CO6: Evaluate different types of maintenance and safety in web offset printing machine (K4)

**CO-PO Mapping: (3 – Strong, 2 – Moderate and 1 – Weak**)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 | | | | | | | | | | | |
| **CO2** | 3 | 2 | 2 | | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO3** | 3 | 1 | 2 | | | 2 | 2 | | 3 | 3 | 3 | 3 | | 2 | |
| **CO4** | 3 | 1 | 1 | | | 2 | 2 | | 3 | 3 | 3 | 3 | | | |
| **CO5** | 3 | 1 | 1 | | | 2 | 2 | | | | | | | | |
| **CO6** | 3 | 1 | 1 | | | 2 | 2 | | | | | | | | |

**Fourth Year Second Semester**

**PRN/PE/B/T/421A: SPECIALTY PRINTING**

**Module 1**
Different types of specialty printing, Functions,

**Module 2**
Currency printing, Stamp printing, Cheque printing, Map printing, MICR, Hologram,

**Module 3**
PCB, Semiconductor lithography,

**Module 4**
Advance printing techniques, Anti-counterfeiting features

**References :**
Moreau Wayne M., Semiconductor lithography : Principles, practices and materials, Plenum Press
Saxby Graham, Practical Holography, Prentice-Hall
Boss hart C. Walter, Printed Circuit Boards, Tata McGraw-Hill Publishing

**Course Outcomes**
The students of the course should be able to
CO 1: Describe different types of specialty printing, functions etc. (K1)
CO 2: Discuss currency printing, stamp printing, cheque printing, map printing etc. (K2)
CO 3: Apply MICR, hologram, pcb, semiconductor lithography etc. (K3)
CO 4: Analyse anti-counterfeiting features (K4)
**CO-PO Mapping(3 – Strong, 2 – Moderate, 1 – Weak)**

| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PO 11** | **PO 12** | **PSO 1** | **PSO 2** | **PSO 3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 1 | | | | | | | | | | | | |
| **CO2** | 3 | 2 | 1 | | | | | | | | | | | | |
| **CO3** | 3 | 2 | 1 | | | | | | | | | | 1 | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO4** | 2 | 3 | 1 | | | | | | | | | 2 | | 1 | |

## PRN/PE/B/T/421B: COLOR MANAGEMENT SYSTEMS

**Module 1**

The need for color management systems and their architectures, Closed-loop color, Color space conversion, Characterization and calibration of devices,

**Module 2**

Color Standards, Color notation systems, Calculations of Colorimetric Quality Factor, Color processing of digital photographs, Color gamut calculations and mapping,

**Module 3**

Color management in digital film post-production.

**Module 4**

Creating and evaluating device Profiles, Color Management Tools.

**References:**

Rich Adams and Joshua Weisberg, GATF Practical Guide to Color Management, GATF Press
Phil Green, Color Engineering, GATF

**Course Outcomes:**

The students of the course should be able to

CO1: Create profiles for display, input and output devices (K6)

CO2: Apply appropriate color management settings in pre-press (K3)

CO3: Reproduce and match color across various devices and software applications (K3)

CO4: Understand advanced concepts in color management (K2)

### CO-PO Mapping (3 – Strong, 2 – Moderate, 1 – Weak)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 3 | 1 | | | | | | | | 2 | 2 | |
| **CO2** | 3 | 3 | 2 | 3 | 3 | | | | | | | | 2 | 2 | |
| **CO3** | 3 | 3 | 2 | 3 | 2 | | | | | | | | 3 | 3 | |
| **CO4** | 3 | 3 | 3 | 3 | 3 | | | | | | | | 3 | 3 | |

**PRN/PE/B/T/421C: DIGITAL PUBLISHING**

**Module 1**

Fundamental of Publishing: Computer assisted Publishing; Electronic Publishing; Database Publishing; Web publishing Readability & Legibility of text on screen & paper regarding Character, Formatting, Color & Contrast, Dynamic text presentation.

Page Construction: Concepts of BOX & GLUES; Rules for breaking paragraph into lines; List of lines into pages; Basic principle of justification and Hyphenation procedures; Typographic markup languages as publishing standards like ASPIC, SGML system, other extension of SGML like html, xml, Javascript.

**Module 2**

Document Development System: Direct Manipulation interfaces; Source language model; Task domain like Direct manipulation graphics editing, Graphics programming, Formatting & layout, Pre & Post processing, Imaging Files and interchanges, Annotations/ Narration & dynamic reading; Basic structure of a document development system and its application in the latest document imaging software.

Styles In Document Editing System: Static functionality & Dynamic functionality; Styles; Style rules; Style design issue; Document structure like Consistency of style, Caption Selection of fonts, Heading & Subheading with text matter; house style.

**Module 3**

Publishing Management System: Publication representation; Publication environments; Publication node structure; Version management; Content objects & processing objects; Publication naming; Information sharing Hypertext and its principle.

**Module 4**

Digital publishing formats: Postscript: pdf, epub, lit etc Multimedia System: Application of multimedia in web publishing. Multimedia tools. Multimedia presentation and editing.

**References:**

Card, M., Interfacing wordprocessors and phototypesetters, Blueprint, London.

Goldfarb, Charles F & Rubinsky, Yuri (Contributor) The SGML Handbook, Clarendon Pr

Musciano, C. & Kennedy, B., HTML and XHTML: The Definitive Guide, Shroff Publishers &

Distributors Pvt. Ltd., Kolkata

Steinmetz, Ralf & Nahrstedt, Klara, Multimedia: Computing, Communications, and applications, Pearson Education, Asia.

**Course Outcome**

The students of the course should be to

CO1: Analyze and synthesis of graphical information (K4)

CO2: Discuss display devices. (K2)

CO3: Discuss interactive input devices in details. (K2)

CO4: Manipulation of two dimensional forms. (K3)

**CO-PO Mapping (3-Strong, 2-Moderate and 1 –Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | 3 | 2 | 1 | | | | | | | | | | 3 | | |
| **CO 2** | 2 | 3 | 1 | | | | | | | | | | 3 | | |
| **CO 3** | 2 | 3 | 1 | | | | | | | | | | 3 | | |
| **CO 4** | 2 | 3 | 1 | | | | | | | | | | 3 | | |

**PRN/PC/B/CSE/T /422: COMPUTER GRAPHICS**

**Module 1**

Analysis and synthesis of graphical information -pixel and vector graphic. Discussion of display devices, graphical and data structures, transformations.

**Module 2**

Interactive techniques. Characteristics of interactive input devices, light pens, tablets and scanners.

**Module 3**

Computer manipulation of two dimensional forms, three dimensional graphics, hidden lines, surface, perspective and shedding.

**Course Outcome**

The students of the course should be to

CO1: Analyze and synthesis of graphical information (K4)

CO2: Discuss display devices. (K2)

CO3: Discuss interactive input devices in details. (K2)

CO4: Manipulation of two dimensional forms. (K3)

**CO-PO Mapping (3-Strong, 2-Moderate and 1 –Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | 3 | 2 | 1 | | | | | | | | | | 3 | | |
| **CO 2** | 2 | 3 | 1 | | | | | | | | | | 3 | | |
| **CO 3** | 2 | 3 | 1 | | | | | | | | | | 3 | | |
| **CO 4** | 2 | 3 | 1 | | | | | | | | | | 3 | | |

**PRN/PC/B/T/423: DIGITAL IMAGE PROCESSING**

**Module 1**

Digital Image Fundamentals: Digital image representation, elements of digital image processing systems. Sampling and quantization. Basic relationships between pixels. Imaging geometry.

**Module 2**

Image Transform: Fourier transform, Two dimensional Fourier Transform, FFT, other separable image transform. Image Enhancement: Spatial domain model, Frequency domain model, Enhancement by point processing, spatial filtering, enhancement in frequency domain.

**Module 3**

Colour image processing. Image Restoration: Degradation model, Diagonalization of circulant and block-circulant matrices. Algebraic approach to restoration. Inverse filtering. Least mean square filter. Image Segmentation: Detection of discontinuities, Edge linking and boundary detection. Thresholding. Region-oriented segmentation. Restoration and Description: Representation schemes, Boundary descriptors, Regional descriptors.

**Module 4**

Recognition and Interpretation: Elements of image analysis. Pattern and pattern classes.

**References:**

Giardina, Charles R. & Dougherty, Edward R., Morphological methods in image and signal processing, Prentice Hall, NJ, USA

Gonzalez, R.C. & Woods, R.E., Digital Image Processing, Pearson Education, Asia

Jensen, John R., Introductory Digital Image processing: A Remote Sensing Perspective, Prentice Hall, NJ, USA.

**Course Outcomes**

The students of the course should be able to

CO 1: Describe the underlying concepts different digital image processing operations (K2)

CO2: Apply the concept and algorithms of digital image processing in given image (K3)

CO3: Analyze the requirement of probable image processing operation(s) for given goals (K4)

CO 4: Explain the performance of digital image processing operations in the light of different image evaluation measures (K5)

**CO-PO Mapping (3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | | 1 | | | | | | | | | 1 | | |
| **CO 2** | 2 | 3 | | 1 | 1 | | | | | | | | 1 | | |
| **CO3** | | 3 | 2 | | | 1 | | | | | | | | 1 | |
| **CO4** | | 3 | 1 | 2 | | | | | | | | | | | 1 |

## PRN/PC/B/T/424: QUALITY CONTROL IN PRINTING INDUSTRY

### Module 1

Conceptual aspect of quality and quality printing, defect detection versus defect prevention, establishment of the process capability via sampling and statistics, the use of statistical process control (SPC) tools, Overview of Six Sigma, control charts for variables, additional SPC techniques for variables, fundamentals of probability, control charts for attributes, lot-by-lot acceptance sampling by attributes, acceptance sampling systems, reliability, and management and planning. The substantial use of probability and statistical techniques is reduced to simple mathematics or is developed in the form of tables and charts. Management role in creating quality environment, densitometry for measurement, ANSI standards on color printing, use of quality control devices for process control, and case studies on planning and implementing quality improvement programs in various printing environments.

### Module 2

Quality Assurance of Print Materials-ink testing, Short term, Long term, press performance and dry print performance tests for ink,, paper and other substrate testing. Optimizing the Press Process Control Digital Workflow: Advantages of Digital Technology , Film vs. Digital File ,

### Module 3

Standards in Graphic Arts Open vs. Proprietary Systems, Types of Standards : ISO, ANSI, CGATS, CIE, ICC, Published Characterizations of Print ProcessesSWOP ,SNAP GRACoLProofing in the Graphic Arts, The Proofing Cycle , Traditional Proofs, Digital Proofs, Dye-Sublimation & Thermal Wax Proofers, Toner Proofers, Ink-Jet Proofers, Halftone Digital Proofers, Soft Proofing, Remote Proofing Document Management, , Job Tickets and Tracking, Press and PostPress Control,

## Module 4

Tasks in a Digital Production Workflow, Creation, Preflight, Image Capture, Page Preparation, File Repair, Image Swapping , Imposition, Trapping, Proofing, Hold for Approval, Raster Image Processing, Output/Imaging , Backup/Archiving , Information Systems Create Logic Blocks That Fit Your Structure, Task Integration and Location.

**References:**

Ric withers, Digital Workflow, 2000
Apfelberg H.L. and Apfelberg M.J., Implementing Quality Management in the Graphic Arts, GATF

**Course Outcomes**

CO1: Describe various tools and statistical process control techniques. (K2)
CO2: Solve different problems related to Printing and Packaging production and Quality control systems. (K3)
CO3: Identify different quality Parameters and issues in printing and graphics industries. (K1)
CO4: Describe Management role in creating quality environment.(K2)
CO5: Classify different Quality Assurance test for print materials –ink test. (K4)
CO6: Analyze the Press Process Control Digital Workflow. (K4)

## CO-PO Mapping: (3 – Strong, 2 – Moderate and 1 – Weak)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 | | | | | | | | | | | |
| **CO2** | 3 | 2 | 2 | | | 2 | 2 | | 3 | 3 | 3 | 3 | | | |
| **CO3** | 3 | 1 | 2 | | | 1 | 2 | | 3 | 3 | 3 | 3 | | 2 | |
| **CO4** | 3 | 1 | 1 | | | 2 | 2 | | 3 | 3 | 3 | 3 | | | |
| **CO5** | 3 | 1 | | | 2 | | | | | | | | | 2 | |
| **CO6** | 3 | 1 | | | 2 | | | | 3 | | | | | | |

## PRN/Honours/H/T/425: PRINT PRODUCTION MAINTENANCE

## Module 1

Maintenance – definitions, objectives. Types of equipment maintenance – Planned maintenance and unplanned maintenance.

Types of Planned maintenance – Preventive maintenance, Predictive maintenance and Scheduled maintenance – Merits and demerits.

Unplanned maintenance – Breakdown maintenance or Emergency maintenance – Merits and demerits. Contract maintenance – definition – merits and demerits.

Preventive Maintenance Functions – Planning, scheduling, Repair cycles, Dispatching and Controlling.

## Module 2

Safety Precautions and House Keeping – safety precautions to be followed in press area and Five steps of housekeeping (5S method).

Total productive maintenance (TPM). Six big losses – measuring the losses. Evaluation of overall equipment effectiveness.

## Module 3

Maintenance of mechanical drive systems – Chain drives, Belt drives, Gear drives. Direct drive technology – Introduction, Advantages and application in print production. Electrical maintenance – AC and DC motors, Maintenance check list for motors.

Maintenance of Mechanical and Electrical Elements. Mechanical elements – Bearings, types of bearings. Cams and Followers, types of cams and followers. Springs, types of springs. Electrical elements – Contactors and its types, Limit Switches, Overload Relay Switches and its types. Sensors and Detectors and its applications. Introduction to electrical panel.

Lubrication – Introduction, Advantages, Types of Lubricants. Lubrication schedule, chart and paint marks.

## Module 4

Equipment and tools used in Erection and recondioning. Test run – types of test runs – Idle, Performance, Accuracy, Rigidity and Vibration test.

Pneumatic system maintenance and hydraulic system maintenance.

Mechatronics – Introduction and applications in Print Production.

**Course Outcome:**

The students should be able to

CO1: Understand the basic concepts of maintenance management

CO2: Learn about the fundamentals of different drives, machine elements, machine erection and testing.

CO3: Create a maintenance schedule

CO4: Evaluate equipment effectiveness

## CO-PO Mapping: (3-strong, 2-moderate and 1-weak)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 | 3 | 2 | | | | | | | 2 | 2 | |
| **CO2** | 3 | 2 | 2 | 2 | 3 | 2 | | | | | | | 3 | 3 | |
| **CO3** | 3 | 1 | 2 | 2 | 2 | 1 | | | | | | | 2 | 2 | |
| **CO4** | 3 | 1 | 3 | 2 | 3 | 2 | | | | | | | 2 | 3 | |

## PRN/PS/B/S/421: PROJECT – II

Topic of project to be selected jointly by the assigned teacher and the student. A typed project report in duplicate is due at the end of the semester.

**Course Outcomes:**

The students of the course should be able to

CO1. Organize the planning and execution of a proposed engineering project (K4, A5)

CO2. Compile a scientific document summarizing the knowledge generated (K5, A5)

CO3. Create an engineering data base / design/ advanced knowledge (K6)

CO4. Display grasp of the chosen topic (A5)

**CO-PO Mapping (3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 3 | | | | | | 1 | 2 | | | 1 | | | |
| **CO 2** | 2 | 2 | | | 1 | | | | 2 | 3 | | | | 2 | |
| **CO3** | 2 | 2 | 3 | | 2 | | | | 2 | | | | 2 | 2 | |
| **CO4** | 2 | 1 | 2 | 3 | | | | | | 1 | | 1 | 2 | | |

## PRN/PC/B/S/422: MATERIAL TESTING AND QUALITY CONTROL LAB

### Module 1

Material Testing: 1. Analysis of ink - chemical and instrumental techniques. 2. Pigment testing - size analysis - by microscope and centrifuge, Grind gauge to measure dispersion, Resistance tests - Resistance against acid, alkali, wax, soap, plasticised bleed, deep freeze etc. 3. Resin testing - acid value, hydroxyl value, solubility, melting range, color

### Module 2

4. Varnish and oil - iodine number, saponification no., water content, refractive index, diene value. 5. Solvent - Boiling range, relative density, flash point, aromatic content. 6. Short term ink testing - dispersion, viscosity, flow, strength, hue, opacity gloss. 7. Long term ink testing - Drying time and setting time. 8. Press performance test and printability.

### Module 3

9. Dry Print Performance tests - resistance tests, adhesion flexibility, slip, blocking, set-off, strike-through 10. Paper testing - Physical testing - grammage, thickness, density, smoothness, porosity, sizing. Strength testing -tensile strength, bursting strength etc. 11.Polymer testing - instrumental and chemical tests for indentification and quantification. 12. Ink formulation using spectrophotometer

### Module 4

Quality Control: Measurement and control of print quality viz. 1. Print Contrast 2.Solid Ink Density 3.Hue error 4.Greyness 5. Sequential priorities of multi-color print 6. Trapping, etc. using Densitometers

**References:**

R.H. Leach, Printing Ink Manual, Kluwer Academic Publishers

**Course Outcomes:**

CO1: Analyse of ink-chemical and instrument techniques. (K2)
CO2: Experiment on the different quality Parameters in printing industry. (K2,K4)
CO3: Develop a comprehensive idea on data collection, analysis and presentation. (K3, A3, A4, S3)
CO4: Experiment with spectrophotometer Quality Control: Measurement and control of print Quality (K4, S3)

**CO-PO Mapping: (3 – Strong, 2 – Moderate and 1 – Weak**)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 | 3 | | | | 3 | 3 | 3 | 3 | 2 | 2 | 2 |
| **CO2** | 3 | 2 | 2 | | 3 | 2 | 2 | | 3 | 3 | 3 | 3 | 2 | | |
| **CO3** | 3 | 1 | 2 | | 3 | 1 | 2 | | 3 | 3 | 3 | 3 | 2 | 2 | 2 |
| **CO4** | 3 | 1 | 1 | | 3 | 2 | 2 | | 3 | 3 | 3 | 3 | 2 | | |

## PRN/PC/B/CSE/S/423: COMPUTER GRAPHICS LAB

To supplement the theoretical course on "Computer Graphics".

**Course Outcome**

The students of the course should be to
CO1: Produce text effects through programming. (A5)
CO2: Produce image effects through programming. (A5)
CO3: Reproduce various colored graphics. (K1)
CO4: Develop various graphical transformations through programming. (K3)

**CO-PO Mapping (3-Strong, 2-Moderate and 1 –Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | 3 | 2 | 1 | | | | | | | | | | 3 | | |
| **CO 2** | 2 | 3 | 1 | | | | | | | | | | 3 | | |
| **CO 3** | 2 | 3 | 1 | | | | | | | | | | 3 | | |
| **CO 4** | 2 | 3 | 1 | | | | | | | | | | 3 | | |

## PRN/PC/B/S/424: DIGITAL IMAGE PROCESSING LAB

**Module 1**

1. Introduction to image handling in Matlab

2. Basic gray level transformation – invert, log transform, power-law transform
3. Contrast stretching, histogram equalization
4. Logical operations – image subtraction, image averaging

**Module 2**

5. Smoothing spatial filters Ie. Smoothing linear filter, order statistics filters
6. Sharpening spatial filters IE. First derivatives, second order derivatives – the Laplacian, unsharp masking, high boost filter, the gradient

**Module 3**

7. Frequency domain operations – introduction to implementation of fast Fourier transform
8. Frequency domain filter designing – low-pass filters, high pass filter, band-pass filters
9. Basic image restoration filtering – median filter, max-min filter, mid-point filter, alpha trimmed mean filter, adaptive filters, Notch filters

**Module 4**

10. Edge detection algorithms – gray scale and color
11. Image morphing – dilation, erosion, opening, closing, boundary extraction, connected component extraction.

**Course Outcomes:**

The students of the course should be able to

CO 1: Experiment the fundamental image processing algorithms and examine the results (K3, A2)

CO 2: Interpret the result applying different image processing algorithms with different parameter settings and explain the differences among the results (K2, A1)

CO 3: Develop and execute the problem specific functions in image processing(K3, S2)

CO 4: Assess and differentiate between the performances of image processing algorithms (K4, A3)

**CO-PO Mapping (3 – Strong, 2 – Moderate, 1 – Weak)**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | | 1 | | | | | | | | | 2 | | |
| CO 2 | | 3 | | 2 | 1 | | | | | | | | 1 | | |
| CO3 | | | 3 | 1 | | | | | | | 2 | | | 2 | |
| CO4 | 2 | | 1 | 3 | | | | | | | | | | 1 | |