



B.Tech (Printing, Graphics & Packaging)

Syllabus

Duration: Four year

Eligibility: 10+2 with non-medical or medical stream

w.e.f. Academic Session: 2014-2015

Institute of Mass Communication and Media Technology

Kurukshetra University

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SCHEME OF STUDIES & EXAMINATIONS
B. Tech. (Printing, Graphic & Packaging)
Vth Semester

Course No.	Course Title	Internal Assessment	Exam. Schedule		Total Marks	Time
			Theory	Practical		
501	PRINTING AND PACKAGING MATERIALS	25	75		100	3 Hrs
502	PRE-PRESS TECHNOLOGY	25	75		100	3 Hrs
503	WEB OFFSET TECHNOLOGY	25	75		100	3 Hrs
504	FLEXOGRAPHY TECHNOLOGY	25	75		100	3 Hrs
505	PRINTING IMAGE GENERATION	25	75		100	3 Hrs
506	DESIGN & PLANNING FOR PRINT & PACKAGING	25	75		100	3 Hrs
	LAB					
511	PRE-PRESS TECHNOLOGY-LAB	25		50	75	3 Hrs
512	WEB OFFSET TECHNOLOGY-LAB	25		50	75	3 Hrs
513	FLEXOGRAPHY TECHNOLOGY-LAB	25		50	75	3 Hrs
514	PRINTING IMAGE GENERATION-LAB	25		50	75	3 Hrs
	TOTAL				900	

501
PRINTING & PACKAGING MATERIALS

Time : 3 hours

Max. Marks: 100
(25+75)

Note: The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Unit - I

Metals

Type of metals and characteristics of metals used for type alloys for foundry types, hot metal composition and stereos, Physical and chemical properties of aluminum, zinc, copper, nickel, chromium, magnesium in relation to printing applications.

Photographic Materials

Main kinds of films and photographic papers used in graphic origination Films positives, mainbase, stripping, thickness, right and wrong reading, negatives; paper positive materials. Developers, Reducers, Intensifiers.

Unit - II

Light Sensitive Materials

Various sensitized materials, used and relationship with processes Silver halide emulsions-classification according to speed, contrast and spectral sensitivity.

Paper and Ink

Fibrous and Non-fibrous materials used in paper and board manufacturing. General characteristics and requirements of printing inks formulations pigments, vehicles, varnishes, solvents, agents.

Unit - III

Adhesives

Classes and characteristics of adhesives used in binding and warehouse work and their range of applications selection for specific purpose.

Miscellaneous Materials

Book binding materials Different types of rubber used in printing. Use of leather, cloth, rexine, threads, tapes, stitching wire, metal foils and covering materials used for binding and print finishing.

Unit - IV

Materials Handling

A brief Survey of materials handling and storage, Handling and storage of paper, printing surfaces, films, chemicals and other printing materials. Systems and methods of storage. Precautions in handling, storage, use and care of various printing substrates, materials and chemicals. wastage reduction. Receiving, storage and delivery of raw, semi finished and finished products.

Recommended Books :-

- Printing Surface Preparation by C. S. Mishr

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PRE-PRESS TECHNOLOGY**Time : 3 hours****Max. Marks: 100**
(25+75)

Note: The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Unit - I**Introduction to colour**

Basic colour theory, additive and subtractive colours, process colours, application of the colour theory to colour reproduction. Overview of colour reproduction from original to printing.

Choosing a Transparency for Reproduction

Exposure level, colour balance, memory colours; grainers, contrast; highlight retouched original transparency, evaluation the transparency.

Unit - II**Colour Reproduction**

Essential requirements of cameras, lens, illuminations filters and half tone screen for colour reproduction work Tone and colour controls, Gray scale and colour control patches the ink/paper/colour interaction Measurement and control of colour printing using the densitometers.

Colour Separating methods

Basic principles of colour separation, Direct separation method and Indirect colour separation method, procedure followed for each method, Methods and procedures followed for making the black printer negative for the indirect method, for making continuous tone positives and the making of final screened negatives and positives establishing a colour reproduction procedure.

Unit - III**Colour correction**

Objectives of colour correction ; Hand correction, Purposes and procedure followed; retouching techniques; correcting colours, tones and shades given inks and paper. Dot etching, purposes and procedure, flat etching, staging and etching, local reduction, blending; Masking; purposes of masking types of maskings, their clarification and uses; Electronic colour separation and correction.

Unit - IV**Colour proofing**

Press proofing methods and various pre-press proofing systems; uses and limitations of prepress sheet, Interpreting pre press proofs and predicting, press results Control devices for proofing systems.

Planning for colour work

Introduction & Working of image capturing techniques of Drum, Flat Bed Scanners & Image Setters.

Recommended Books :-

1. Dr. R.W.G. Hont :- The reproduction of colour. Fountain Press, 4th edition.
2. Miles Southworth & Donna Southworth :- Colour Reproduction. Graphic Arts Publishing, 3.1 edition.
3. Gary G. Field :- Tone & Colour correction (GATF).

503
WEB OFFSET TECHNOLOGY

Time : 3 hours

(25+75)
Max. Marks: 100

Note: The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Unit - I

Development and growth of web offset press

Full size and mini web press; four basic types of web offset press, Press specially used for newspaper and magazine production in single and multicolour, Factors to be considered for selecting the press.

Components of web offset press

Infeed, tension control Pre-conditioners, drier and chill rolls, folders, sheeters and winders, Adjustment, operation and maintenance of the major components.

Inking systems and dampening systems for web offset

Conventional and non-conventional dampening systems, UV inks and setting systems Causes and correction of ink-related problems, Properties and requirements of heat set inks.

Unit - II

Web Control

Roll stands and automatic pasters, Detection of web breaks and control of tension, Web Flutter, casues and correction of misregister, Control of fan out, Sidelay, cut-off, web-to-web and ribbon control.

Auxiliary equipment

Various types of in-built and optional equipment availability for web-offset and their uses; -Remote control console, Plate scanners, scanning densitometer, closed-loop system, web preconditioners, sheet cleaners, ink agitators, water coded ink oscillators, fountain solution recirculation systems, fountain solution mixers, refrigerating fountain solution, automatic blanket washers, side lay sensors, web break defectors, remoisturizers-liquid applicator system, roller applicators systems, antistatic devices, Imprinters, Perfectors, cutoff controls, straboscope, synchroscope, counters-Denex laser counter, stobb counter.

Web-paper ,Plate and blankets

Properties and requirements of paper used for web offset Printability, Care and handling of rolls. Various types used for web-offset, their characteristics, merits and demerits for specific work, Cylinder pressures and Printing Make-ready.

Unit - III

Dry Offset

Dry-offset; advantages and disadvantages, Comparative study of dry offset, letterset and lithographic offset processes, difference between dry offset and letterset machines and inks job suitability.

Description of the process, Method of producing image and non-image areas, Importance of the correct formulation of waterless lithographic inks.

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Unit - IV

Introduction to types of drives used in web offset machines
Brief introduction to control panels of the web offset machines.

Folders

Introduction, folding principles, parts of folder, combination folder, ribbon folder, double-former folder, the me-chanics of folding process of jaw fold, chopper fold mechanism. Operation of collect cylinder, press folders, double former prefolder, flow folders, insert folders.

Recommended Books :

Web offset press operating- **David B. Crouse** Offset M/c II - **C. S. Mishra** Manual for Lithography Press Operation - **A. S. Porter**

504
FLEXOGRAPHY TECHNOLOGY

Time : 3 hours

Max. Marks: 100
(25+75)

Note: The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Unit - I

Introduction to Flexography:

Definition. flexographic printing, flexographic market, flexographic products, growth potential, Advantages of flexography, Press development. Mechanical principles of flexography - Fountain roll, Anilox roll, plate cylinder, impression cylinder.

Image carriers for flexography:

Introduction. Thickness of flexo graphic plates. Photopolymer flexographic plates Advantages of photo polymer plates. Disadvantages of photo polymer plates. Solid photo polymer plates. Photo initiators and photo sensitizers. Washout solvents. Liquid photo polymer plates. Base material for photo polymer plates. Rubber flexo plates, photo engravings, duplicate plates. Rubber plate making process – Advantages of rubber plates, disadvantage of rubber plates. Photo polymer plate making process, sheet photo polymer plate making, liquid photo polymer plate making. Letter press plates – Introduction, photo polymer letterpress plates

Unit - II

The Printing press:

Flexo press types - Stack press, Central impression cylinder press, Inline press, Tension control in flexographic m/c, Unwind equipments - general, single-position unwind - flying-splice unwind, unwind tension systems, cooling drum a out feed unit. Rewind equipments - surface winders, center winders, rewind tension systems. Web guides. Printing stations - two roll, anilox roll, reverse angle doctor blade system, Deck control, Continuous inking, side and circumferential register control, Dryers. Mechanical components - CI drum, plate cylinders. Anilox roll - construction, cell structure, anilox roll wear, selecting the right anilox roll, chrome plating. Fountain rolls - formulating rubber for rolls, Flexo roller covering, Care of covered rolls.

Unit - III

Mounting and Proofing:

Introduction. Checking the equipment. Operation care of equipment. Understanding the mounting instructions. Mounting and proofing a complete line job - proofing the first set of plates, proofing for printability, methods of prepress makeready, wrapping mounted cylinders. Miscellaneous procedures - removing plates from the cylinder, mounting metal-backed plates, reusing sticky back, plate staggering, use of release agents. Tools for the operator. Basic requirements for process colour printing. Press room practices. Environment and safety concerns.

Flexography and Barcoding:

Barcode structures. Types. Verifying/Analyzing printed barcodes. UPC and flexographic printing. UDC film masters and printing capability tests. The shipping container symbol (SCS). SCS shipping contain Barcode printing.

Unit - IV**Beyond the Horizon- Tomorrows Flexography:**

Flexographic substrates. Narrow web presses-Narrow web press components, Future narrow web flexography. Wide web presses. Corrugated presses. Pre printed liner presses. Future of Ink distribution system. Tomorrows flexographic plates. News print for water-base flexography. Markets for today and tomorrow.

Recommended Books :

Flexography principles and practices - Foundation of flexographic technical association.

PRINTING IMAGE GENERATION**Time : 3 hours****Max. Marks: 100**
(25+75)

Note: The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Unit - I**Assembly of film images:**

Photographic film- camera film, contact film, room light handling films, duplicating films. Proofing materials - diazo papers, polymer papers, brown print paper, diffusion transfer material, Stripping supplies - screen tints, pressure sensitive tapes, adhesives opaques, cleaning solutions, starch filler, register tabs button & pins. Register masks, GATF image contact masks. Basic steps in planning a film image assembly Film assembly for single color printing. Assembly for film multiple color printing. Assembly for multiple imaging of plates and film.

Unit - II**Planographic plates:**

Introduction. Light sensitive coating -dicromated colloids, diazo compounds, photo polymers, diffusion and transfer methods, electrostatic. Sensitivity of coating to light. Dye-sensitized photo polymerization, dark reaction, post exposure, safe lights, reciprocity law. Action of light sources on coatings, stabilities of coatings. Plate materials - zinc, aluminum, brass, copper, steel, chromium. Action of oil and water on metal - contact angle. Ability to withstand cracking. Light sources for plate making - spectral data for various light sources, metal halide, mercury lamps, pulsed - xenon, laser. Treatment of non-image areas - desensitizing gum, chemistry of gum Arabic, other natural & synthetic gums. General processing sequence for a negative working plate. General processing sequence for a positive working plates. Negative working plates- additive presensitized plates, subtractive diazo PS plates, photo polymer presensitized plates, aqueous developable plates, driographic plates, multi metal plates. Producing a multimetal plate. Types- bimetallic, trimetallic. Projection-speed negative plates. Positive working lithographic plates- Presensitized plates, Electrostatic plates. Baking of positive plate Process of making deep etch plate - counter etching, exposing, developing, deep etching, cleaning the image areas, stopping out unwanted areas, copperizing the image areas on aluminum plate, applying non blinding lacquer applying deep etch developing ink, remaining the gum stencil, desensitizing, gumming up,

Unit - III

Driography- Outline, system, structure, processing and use, precautions.
Toray waterless plates – outline, structure, processing and use, advantages and disadvantages.
Role of photopolymer in Image formation – Raised and Recessed.
Diffusion processes – Reflex and Projection plates.
Electro photography – Introduction, process, toner transfer theory, Equipment.
Water soluble photosensitive resin plates – introduction, characteristics, structure, processing, image reproductivity.
Laser plate making – introduction, system outline, system performance, implications.
Computer-to-plate :- Thermal plate, Polyester plate.

Unit - IV

Gravure image carrier:

Methods of cylinder preparation – diffusion etch, direct transfer, electromechanical process, laser cutting, Well formation- lateral hard dot wells, direct contact wells, conventional gravure wells. Cylinder design – part of gravure cylinder, forms of gravure cylinder- integral shaft, mandrel. Copper plating and polishing. Reuse of cylinders. Ballard shell cylinders. Cylinder layout and film assembly. Carbon printing – Tissue lay down and development, staging and etching. Cylinder proofing – soft copy proofs, single sheet proofing system, direct digital proof, Diazo chrome proofs, overlay proofs. Chemical engraving methods- advantages, disadvantages.

Digital Image Carriers:

Image generation of a Digital Offset Machine. Basics of other digital image carriers. Auto plate processor, Troubleshooting for plates, Quality control aids for plate making.

Recommended Books:-

Heidelberg DI Press- Manual Chemistry for Graphic Arts - **Dr. Nelson R. Eldred**.
Offset Plate Making - **Robert F. Reed**.
Printing Technology 3rd Edition. - **Adams, Fax & Rieber**.
Screen Process Printing - **John Stephens**.
Sheetfed Offset Press Operating - **Lloyd P. Dejidas**.
Flexography Premier - **Donna C. Mulvihill**.
Stripping - **Harold L. Peck**.
Gravure Process And Technology –GAA.
Selecting The Right Litho Plate - BPIF.
A. L. Gatehouse; Manual for film planning and plate making; roper – GATF Publication, 1983 edition.
Lithographers manual – GATF seventh edition.
Paul J.Hartsuch Chemistry for the Graphic Arts, GATF, 1983 edition.
Lan Faux, Modern lithography, MacDonald & Evans Publication, 1973. Edition.
W.R. Durrant Printing – A guide to systems and their uses, Heinemann Professional Publishing, 1989 edition.
D.C. Mulvihill Flexo Primer, GATF & Foundation of FTA 1985 editon.

DESIGN AND PLANNING FOR PRINT & PACKAGING**Time : 3 hours****Max. Marks: 100**
(25+75)

Note: The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Unit - I**Introduction:**

Importance of a good design. Impact of a design on various target audience. Relationship between design and sale of a product. Graphic designer and his role. Elements and Principles of design.

Basic design and letter forms:

Visual ingredients of graphic design, point, line, graphic space, shape, texture, color, scale, balance and contrast. Use of computers in designing. Introduction to some designing softwares. Suitability of a design for printing technique and paper surface. Legibility and readability, Monograms and trademarks.

Unit - II**Images in design:**

The relationship between type, illustration and Photography. Types of images. Selection and assessment of originals, photographs, sketches, paintings. Factors to be considered for preparation of a design.

Design management:

Relationship of a design studio with production and sales departments of a press. Control and checking of artwork at all stages, employment of free-lance artists, designers and photographers. The advertising agency, its structure and its services.

Unit - III**Design process:**

Methods of preparing a design in various stages. Design for books, magazines, newspapers, catalogues, cartons and commercial stationery. Materials and tools used in preparing layouts and artwork. Copy preparation. Casting-off and marking-up.

Unit - IV**Production planning:**

Selection and co-ordination of production processes. Consideration of composition methods. Limitations of binding, finishing and ancillary processes affecting design. Selection and specification of ink, paper and other materials in relation to design specifications and to the production process.

Reference Books :

Fundamentals of Copy & Layout - **A. C. Book(Ac) Sohick(Cd)**

Production for the Graphic Designer. – **Craig**.

How to brief designs & buy print. - **Murray(Ray)**.

Lithographic Press Work. - **A. S. Porter**.

Principle of CAD.- **Rooney J. & Steadman P.**

Advertisement Management. - **David A. Akar & John G. Myers**.

Elements of Cartography. - **Arthur Robinson, Randall Sale & J. K. Morrison**.

Analysis of Electronic Circuit - **Jal Baker**.

Copy Preparation. - **Leon O Chus & Pen Min Lin C. A.**

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PRE PRESS TECHNOLOGY- LAB

Time: 3 Hours

Max. Marks: 75

(25+50)

LIST OF EXPERIMENTS

1. Making of Half tone negative using process camera.
2. making of own colour control patches.
3. Gray Scale (Drawing).
4. Drawings spectrophotometric curve by using spectro densitometre.
5. How to make colour separation negative of a four coloured original by using Electronic colour separation system.
6. Working of Image Setter and obtaining output on Image Setter.
7. colour Correction by using photography masking.
8. Six Colour Wheel.
9. Planning for four Colour Newspapers designs.
10. Software for colour separation photoshop, coreldraw, quark express.
11. Preparation of originals for separation - reflection type and transparency.
12. Exposing tonal correction mask, making UCR mask/GCR mask etc.

512

WEB OFFSET TECHNOLOGY- LAB

Time: 3 Hours

Max. Marks: 75

(25+50)

1. Premake ready operations.
2. Make ready operations.
3. Multicolour job printing.
4. Trouble shooting during printing.
5. Study of electronic panel.
6. Blanket and plate cylinder setting.
7. Damping roller setting.
8. Inking roller setting.
9. Study of Web-breaks.
10. Operations of Folding machine.

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FLEXOGRAPHY TECHNOLOGY - LAB**Time: 3 Hours****Max. Marks: 75****(25+50)**

LIST OF EXPERIMENTS

1. Introduction and familiarizing flexo machine and other related elements.
2. Preparation of rubber plates.
3. Preparation of I .Liquid photo polymer plates, II. Sheet photo polymer plates.
4. Registering and plate mounting on flexo plate cylinder.
5. Make ready procedures a flexo machine.
6. Printing i.single color, ii.two color, iii.four color.
7. Studying of 6 color and 8 color flexomachines.

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PRINTING IMAGE GENERATION - LAB**Time: 3 Hours****Max. Marks: 75****(25+50)**

LIST OF EXPERIMENTS

1. Comparative study of various materials and equipments used in Image Generation Department.
2. Preparation of wipe-on plates, Albumin plates.
3. Preparing deep-etch plates ,pre-sensitized plate,
4. Preparation of letter set plates.
5. Study of gripper margin and registration processes,
6. Positioning of images for plate making,
8. Page makeup -folders, pamphlets, journals/magazines, newspaper, book work.
9. Layout preparation - Single page layout, 2 page layout, 4 page layout, 8 page layout, 16 page layout, 32 page layout, 64 page layout for work & turn, work & tumble, work & twist.

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