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

SCHEME OF STUDIES & EXAMINATIONS

B. Tech. (Printing, Graphic & Packaging)
III Semester

Course No.	Course Title	Internal Assessment	Exam. Schedule		Total Marks	
			Theory	Practical		Time
301	TYPOGRAPHY & TYPESETTING	25	75		100	3 Hrs
302	FUNDAMENTALS OF PACKAGING	25	75		100	3 Hrs
303	THEORY OF PRINTING MACHINE	25	75		100	3 Hrs
304	DIGITAL ELECTRONICS	25	75		100	3 Hrs
305	REPRODUCTION TECHNOLOGY	25	75		100	3 Hrs
306	SHEET FED OFFSET TECHNOLOGY- I	25	75		100	3 Hrs
	LAB					
311	TYPOGRAPHY & TYPESETTING LAB	25		50	75	3 Hrs
312	FUNDAMENTALS OF PACKAGING-LAB	25		50	75	3 Hrs
313	REPRODUCTION TECHNOLOGY LAB	25		50	75	3 Hrs
314	SHEET FED OFFSET TECHNOLOGY-I LAB	25		50	75	3 Hrs
	TOTAL				900	

301

TYPOGRAPHY & TYPESETTING

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.

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

Unit - I

. Definition typography, concept and scope
. Printing type, definition, it's two-dimensional and three-dimensional concept.
Dimensions of printing types. Printers Measurement and Systems: Point System, other units of measurements and application.
. Physical structures of printing types, their characteristics.
Design features and design principles of printing types, fundamental and finishing strokes of types.

Unit – II

. Classification of printing types based on serifs, point sizes, cases, faces, series, families etc. Identification of printing types, principles of size and design identification.
. Suitability of different types for different processes and publications.
. Calculations relating to type sizes and dimensions of printing pages.

Unit – III

. A brief account of the work and role of the type-setting department with in a printing press. The transformation from hand-setting to photo type-setting. House Style, Good and bad copy; methods of casting off; methods of copy mark-up and copy preparation procedures Reader's marks; word breaks; proofing stages.
Composing Tools and Equipment, Basic composing tools for hand composition, spacing material; locking- up devices; proofing presses, kinds of rules.

Unit –IV

. Imposition, Sheet work, Half-sheet work, Work and tumble & Work and twist. The regular schemes up to 32 pages (upright and landscape).
Planning of composition department, Floor plan and arrangement of equipment.

Recommended Books :

1 Theory & practice of composition - By A.C. Goel
2 Composing & typographny Today - By B.D. Mehandirutta.
3. Letter Press Printing Part I, II - By C.S. Mishra
4. Printing Technology By Adams,Faux,Riber
5. Art & Production By N.N. Sarka

302

FUNDAMENTALS OF PACKAGING

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.

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

Unit - I

Basics of Packaging:

Introduction, Function of a package, Factors influencing design of a package, Computer Aided Package Design, Packaging Cycle, Product Package Relationship, Product life curve, Elements of Package Design. Classification of Packaging - Flexible package type, Rigid package types. Hazards on package - Mechanical, Climatic, Biological and other hazards. Markings on package - Handling marks, routing marks, information marks. Tests on Package- Mechanical test - Drop test, Vibration test, Compression test, Inclined impact test, Rolling test, Climatic tests - Rain test, Sand and dust test, Salt spray test, Fungus resistance test. Shelf life, Cushioning Materials - Functions, properties. Classifications - space fillers, resilient cushioning materials, non resilient cushioning materials.

Unit - II

Packaging Media:

Effect of moisture on wood, preservation of wood, advantages. Boards-types, paper-types. Glass properties, advantages, types, basic approaches to designing a bottle, thermal shock test, pressure test, impact test, density test. Plastics-BOPP, HDPE, LDPE, LLDPE, PVC, PP, PET, Polyolefins, Celluosics, Polymides, advantages, functions & applications. Tests on plastics, Metals - functions, uses. Aluminum foils - Manufacturing of foil, properties, applications, methods of laminating foil to film or paper.

Unit - III

Carton Production & Innovative Packaging Techniques/Processes:

Carton styles. Folding cartons - Production steps, types. Corrugated containers - classifications, components in a corrugated board, flutes, stages in preparation in corrugated boards. Plastic corrugated boards - features & advantages.

Gas packaging - MAP & CAP, Vacuum packaging, shrink packaging, stretch wrapping, blister packaging, skin packaging, strip packaging, Aerosol packaging container, working principle. Injection Blow Moulding, Extrusion blow Moulding, Extrusion. Injection Molding, Compression molding, Thermo forming. Vacuum forming, Pressure forming, Matched mould forming.

Unit -I V

Future Trends:

Futuristic trends in packaging. Advancements in food packaging. Environmental implications of packaging - recycling, Legal aspects in packaging. Designing-Cans, metal tubes, Plastic tubes. Closures-Screw caps, Snap-on caps, Plug closures, Lids, Threaded closures, Crowns. Adhesive tapes - Fabric tapes, Paper tapes, Film tapes, Foil tapes, Foam tapes, Two faced tapes. Labels - Basic elements of correct labeling, Purpose, Types. Ancillary Materials : Sealing tapes Strapping and strapling lables and labeling, Adhesives and packaging.

Recommended Books:

Packaging design and performance - **Frank Paine**
Advances in plastic packaging technology - **John Briston**.
Packaging design an introduction - **Laszlo Roth**.
Packaging Technology - Volume I, II, III - IIP

THEORY OF PRINTING MACHINES

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.

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

UNIT-1

Fluctuating loads and stress concentration, reduction of stress concentration effect. Fluctuating
stress, endurance limit, notch sensitivity.

Cams and Followers:

Types of cams and followers, analysis of motion, determination of cam profiles, followers for cams with specified contours

UNIT-II

Kinematics linkages and Mechanism: Kinematics links, Classification of linkage systems, Kinematics' pairs, Machine, kinematic chain, Mechanism, Degree of freedom for plane mechanisms, types of kinematic chains, inversion of mechanism, Four-bar chain, Single and double slider crank chain, Quick return mechanisms, study of typical kinematics systems used in machines.

UNIT-III

Gears:

Types of gears, terminology, condition for correct gearing, cyclical and involutes profiles of gear teeth, pressure angle, length of path of contact, length of arc of contact, Interference, undercutting, minimum number of teeth to avoid interference, number of pairs of teeth in contact, introduction to helical, spiral, worm and worm gear and bevel gear, numerical.

Gear trains; simple, compound, reverted and epicyclic, compound or sun and planet epicyclic gear train, bevel epicyclical gear train, problems of gear trains.

UNIT-IV

Power Transmission Devices.

Types of belt drives, types of belts, material for belts, open and crossed belt drives, velocity ratio, slip, crowning of pulleys, length of belts, ratio of tensions, centrifugal tension, power transmitted by belts, problems, introduction to V belt drive, rope drive, chain drive, classification of chains.

Recommended Books :

(1) Thomas Bearn, The theory of Machine CBS Publisher and Distributors Delhi.

(2) Anthony Esposito and J. Rober Thrower Machine Design II edition

(3) Joseph E. Shigley, John Vickev Theory of Machine & Mechanisms McGraw Hill International Boom company

(4) Khurmi, Gupta; Theory of Machine, S. Chand Publisher New Delhi.

(5) Khurmi, Gupta; Machine Design, S. Chand Publisher New Delhi.

304

DIGITAL ELECTRONICS

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.

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

UNIT-I

Introduction to digital electronics in the field of printing.

Logic Gates and Boolean Algebra:

Boolean constant and variable, OR, AND, NOT, NAND, and NOR gates, truth tables, Boolean expressions, Boolean algebra. De Morgan's theorems. Realisation of Boolean expressions using universal gates.

Combinational Logic Circuits:

Simplification of Boolean expression and realization using logic gates, sum of products and product of sums, Karnaugh map & variable, minimization of Boolean expressions using Karnaugh map, don't care conditions, variable entered mapping, minimization using variable entered maps.

UNIT-II

Numbering Systems & Binary Arithmetic:

Introduction. Symbolic number systems, Positional number system, Integer Binary numbers - Binary digital computers, Binary number system, Conversions between decimal and binary numbers, Hexadecimal numbers, Conversion between Hexadecimal, Binary & Decimal numbers. Fractional binary numbers - Converting binary fractions to decimal, Converting Hexadecimal

fractions to decimal, Converting decimal fractions to Binary and Hexadecimal. Number System Notation. Binary Addition and Subtraction - Signed binary numbers, Complementary numbers, Two's complement mathematics. Binary multiplication & division. Binary codes - Character codes, Numeric codes, other binary codes, Error correction & detection codes.

UNIT-III

Arithmetic & Data Processing Circuits:

EXOR and EXNOR gates, half adder, full adder, full subtractor, adder-subtractor, look ahead and carry. Multiplexers, demultiplexers, decoders, BCD to decimal decoder, seven segment decoder, encoders, decimal to BCD encoder,

parity generators and checkers.

Flip-Flops & Sequential Logic Circuits:

NAND gate latch, NOR gate latch, SR flip-flop, D flip-flop, JK flip-flop and T flip-flop, clocked flip-flops, edge-triggered flip-flops,

flip-flop conversions. Comparison between combinational and sequential logic circuits, shift registers, SISO,SIPO, PISO and PIPO shift registers,

ring counter, Jhonson counter.

UNIT-IV

Counters, D/A and A/D Converters:

Ripple counters, up counter, down counter, up-down counter, synchronous counters, mod number, mod-3, mod-5 and mod-10 counters, shift counters.

Variable-Resistor network, binary ladder, D/A converter. D/A accuracy and resolution, A/D converters- simultaneous conversion,

counter method, continuous conversion, successive approximation method, single slope and dual slope A/D converters. Digital Camera and Digital Scanner.

Recommended Books :

1. Digital Electronics – Malvino.

2. Digital Electronics – Gothman.

3. Digital Principles and Applications - Donald P Leach, Albert Paul Malvino.

4. Digital Systems-Principles and Applications - Ronald J.Tocci.

5. Digital Fundamentals - Floyd.

6. An Engineering approach to digital design - Fletcher.

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.

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

UNIT – I

Basic principles of reproduction photography: line photography; Basic density range of line original Basic line exposure for computerized camera with on-line or off-line densitometer, equipments and accessories.

Difficult line originals – Line originals with color; line originals with fine lines screen; line originals with fluorescence effect.

Contact photography – Spreads and chokes, Line separation from black and white art work, Evaluation of line negative.

UNIT – II

Halftone photography – Introduction to the concepts, Theories of dot formation, Selection of screen ruling, Introduction to different halftone screens, glass screen (brief study), contact screens – Grey and magenta Contact screen manufacture, Density gradient of contact screens, Negative, Positive, standard or universal contact screen. Pre-screened emulsion.

Half tone exposure: Special features of half tone exposure. Factors affecting the halftone exposure. Basic halftone exposure setting on ordinary and computerized camera with off-line and on-line densitometer.

Unit-III

Contrast control: Contrast with glass screen: S.D. variation, multiple stop system (brief study) Contrast control with contact screens Determining B.D.R. and main exposure of the contact screen, Highlight compensation, Use of CC filters with magenta contact screen determining CC filters and exposure calculations.

Auxiliary or supplementary exposures: Contrast control with supplementary exposures. Flash exposure-Deciding the basic flash exposure, for contact screens Exposure calculations. No screen exposure-calculations.
Line and halftone combination, Evaluation of halftone negative.

Unit-IV

Color Reproduction: Definition and concepts Introduction to Corpuscular and Wave nature of light. The visual spectrum, Additive Synthesis and subtractive synthesis, Additive and subtractive combination for graphic for reproduction and practical interpretation of color-theories.

Mechanism of vision and theory of color-vision, colorimetric Properties, Color and appearance measurement. Introduction to Colorimeter and Spectrometer.

Recommended Books:

Line photography- Karl Davis Robinson
Halftone Photography – Erwin Jaffe
Small Offset Preparation & Process- Les Crawhurst
Printing Technology- Adams, Faux, Rieber.
Reproduction Systems- V.S. Raman
Digital Photography- Anthony Hamber, Phill Green.

SHEET FED OFFSET TECHNOLOGY-I

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.

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

Unit – I

Basic principles in planographic printing:

History of offset process - Principle, advantages, limitations, Types and their uses. Press configurations. Various Required and auxiliary elements.

Unit - II

Infeed unit –
pile table, pile height, air blast nozzles, forwarding pickup sucker, rear pickup suckers, separator brushes & fingers. Types of feed board sheet control devices-conveyor assemblies, conveyor tape, hold down rods. Sheet separation system-friction, pneumatic. Forwarding system-successing sheet feeder, stream feeder. Front lay, Side lay - push type lays, pull type lays. Side lay settings. Sheet detectors - mechanical types, electromechanical types, photo electric types. No sheet detectors- early or fast detectors. Double sheet detectors.

Unit - III

Inking system:

Introduction. Theory of ink-film flow. Dwell timer, ink duct. Ink feed roller. Oscillating roller. Drive rollers. Intermediate & plate inking rollers. Drum type inking system. Multi roller type inking system. Roller setting-Setting form roller to oscillator, setting form roller to plate, setting the duct roller. Roller covering. Roller maintenance-roller removal, replacement, roller storage, roller hardness. Ink agita

Unit - IV

Dampening system:

Introduction. Fountain roller. Dampening feed roller. Scavenger roller. Dampening solution composition, Iso propanol alcohol - substitute of alcohol. pH of dampening solution. Conductivity of dampening system. Damper setting. Brush system for metering. Air knife system for metering. Conventional dampening system - metering dampening on conventional dampening system. Continuous flow dampening system-plate feed-epic litho dampener plate feed continuous flow damp. systems. Dahlgren inker feed dampening system. Roller covers - molleton fabric cover, stockinette cover, paper damper cover, synthetic damper cover. Damper cleaning machine.

Recommended Books :-

Manual For Lithographic Press Operation - **A. S. Porter**
Modern Lithography Introduction to Printing Technology - **Hugh M Speirs**.
Sheetfed Press Operation-**GATF**.
Offset Technology – **C.S.Mishra**.
Lithographers Manual Lithographic Technology - **Erwin A Dennis, Olusegun Odesina**.

311

TYPOGRAPHY & TYPESETTING LAB

Time: 3 Hours **Max. Marks: 75**

(25+50)

LIST OF EXPERIMENTS

1. Block Lettering & Numbering (Normal Types).
2. Italics Types (75 Degree Angle) Lettering & Numbering.
3. Four-line Principle (Drawing).
4. Physical (Features) parts of the type (Structural Diagram).
5. Fundamental strokes.
6. Finishing strokes & their identification.
7. Introduction to various fonts & their drawing characteristics.
8. Newspaper/Magazine clippings of different point sizes.
   (Paste them on Practical Note-book & draw the same).
9. Draw different cases, faces, series & families etc.
10. Draw types with different X - heights, contrasts, serifs, Beak & Terminals.

312

FUNDAMENTALS OF PACKAGING (LAB)

Time: 3 Hours **Max. Marks: 75**

(25+50)

LIST OF EXPERIMENTS

1. Designing and preparation of various flexible packages.
2. Designing and preparation of various rigid packages.
3. Preparation of Jigged die & unit die for a package design.
4. Study and operation of various packaging machines.
5. Manufacturing of various types of corrugated boards.
6. Cutting, creasing and building up corrugated boxes.
7. Designing & preparation of various designs of paper bags.
8. Testing of raw materials like wood, paper, plastic.
9. Test conducted on Cartons, Corrugated packages, wooden packages.
10. Drop test, Vibration test, Inclined impact test, Compression test.

313

Reproduction Technology- LAB

Time: 3 Hours **Max. Marks: 75**

(25+50)

LIST OF EXPERIMENTS

1. Setting of camera.
2. Line negative and positive preparation
3. Halftone negative and positive preparation
4. Bromide positive preparations.
5. Exposing difficult line originals, Use of filters
6. Finding B.D.R. and main exposure time of contact screen .
7. S.D. calculations and S.D. setting and contrast control with glass screen
8. Study of densitometer .

314
SHEET FED OFFSET TECHNOLOGY–I LAB

Time: 3 Hours **Max. Marks: 75**

(25+50)

LIST OF EXPERIMENTS

1. Study of various controls and operations.
2. Study of the various mechanisms.
3. Study of the lubrication system.
4. Setting the feeder, feed board, lays and delivery.
5. Setting the water and ink rollers and fixing the plate.
6. Single colour printing.
7. Identification of printing faults in the given samples-reasons and remedial actions.
8. Mixing of process inks to the shade for a given colour patch-effect of paper and ink film thickness.