



## 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)  
 IV Semester**

Course No.	Course Title	Internal Assessment	Exam. Schedule		Total Marks	Time
			Theory	Practical		
401	PACKAGING TECHNOLOGY	25	75		100	3 Hrs
402	PRINTER SCIENCE	25	75		100	3 Hrs
403	SHEET FED OFFSET TECHNOLOGY- II	25	75		100	3 Hrs
404	MANUFACTURING PROCESS	25	75		100	3 Hrs
405	ELECTRICAL SYSTEMS IN PRINTING MACHINES	25	75		100	3 Hrs
406	COMPUTER GRAPHICS	25	75		100	3 Hrs
	LAB					
411	SHEET FED OFFSET TECHNOLOGY-II LAB	25		50	75	3 Hrs
412	MANUFACTURING PROCESS-LAB	25		50	75	3 Hrs
413	ELECTRICAL SYSTEMS IN PRINTING MACHINES- LAB	25		50	75	3 Hrs
414	COMPUTER GRAPHICS-LAB	25		50	75	3 Hrs
440	INDUSTRIAL VISITS/ EXHIBITION	Student has to submit a visit report on a assigned work by his/her concerned teacher & the report will be evaluate by the examiner appointed by Director/Chairperson.			50	
	<b>TOTAL</b>				<b>950</b>	

**PACKAGING MATERIALS 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 Packaging:** Introduction, Components, Permeability, Mechanisms of Spoilage, Corrosion and Prevention of Corrosion, Package Evaluation, Ecological Aspects, Bar-Coding Application in Packaging.

**Paper & Board Packaging:** Cellulosic Materials, Processes in Cellulose Industries, Paper and Board Manufacture, Testing of Cellulose and Paper Materials, Specialty Papers Folding Cartons, Multiwall Paper Sacks, Composite Containers.

**Unit-II**

**Fiberboard and Glass Technology:** Fiberboard Cartons, Drugs, Glass Containers : Manufacture, Properties, Applications and Testing

**Plastics Technology:** Polymer Chemistry, Classification of Polymers, Properties, Processing of Plastics, Special Plastics and Their applications. Seals, Coatings, Laminates, Adhesives, Reinforcements

**Unit-III**

**Metal containers:** Metal containers : Tins, Cans, Formed Containers, Steel Drums. Cushioning Mechanism, Fragility Assessment, Cushion Design, Testing, Wooden Containers, Textile bags, Containerization and Cargo Marking.

**Foods, Pharmaceuticals, Cosmetics & Chemicals:** Introduction to Food Preservation/ Packaging Technology, Method of storage, Packaging of foods, Pharmaceuticals, Cosmetics and Chemicals. Filling of Dry and Liquid Products, Filling of Carbonated Liquids and other Packaging Techniques, Cartoning, Labeling, Thermoforming.

**Unit-IV**

**Acts and Regulations :** Loss Prevention, Weights and Measures Act/ Packaged Commodities Act, Eco Regulations, Recyclability of Packaging Media and Technologies, Pollution Control, FPO, PFA, FDA, Rules and Regulations, ISO-9000.

**Moulds and Tooling :** Introduction to Design of Moulds and Tooling: Injection Moulds, Blow Moulds, Extrusion dies, Product Design, Designing for Packaging Application

**References:**

1. Packaging design and performance – Frank Paine.
2. Advances in Plastic Packaging Technology – John Bristol
3. Packaging Design an Introduction – Laszlo Roth
4. Packaging Technology – Vol. I, II, III - IIP

## PRINTER SCIENCE

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

**Colloids :**

Characteristics, Proportion, application in Printing Industry.

**Theory of Electro deposition**, Printing equipments, factors affecting nature of Electrodeposits, chromium Plating, Anodizing of metal.

**Introduction to Organic compounds**, Carbon compound, Aromatic compound Diazo compound, Organic Solvents with specific name used in printing Science mainly.

## Unit -II

**Introduction of Photo chemistry**

**Humidity** - Relative humidity, measurement, control by air conditioning.

**Surface characteristics in printing** - Surface tension, contact angles, capillary action, interfacial tension, measurement of contact angle, Hydrochloric and hydrophilic surface, water and ink interaction.

**pH** : pH colorimetric method of determining pH; method of determining pH, pH of paper, ink, pH application in Printing.

## Unit -III

**Photometry –**

Introduction, solid angle, definitions of luminous flux, luminous intensity, illumination power, intensity of illumination of a surface, brightness or luminance of a surface, laws of illumination - inverse square law and Lambert's cosine law, types of photometers, photovoltaic photometer.

## Unit -IV

**Optical Instruments –**

Photographic cameras, Depth of Focus, Telephoto Lens, Visual Angle, Angular Magnification, Magnifying Glass, Simple Microscope, Reflection, Transmission, Opacity, Density, Introduction to Densitometer and its types.

**Effect of light** : different plate and film coatings, adhesives & Ink -films, Light fastness and print characteristics.

Introduction and brief study of process cameras, contact printer and safe light and process chemicals.

**RECOMMENDED BOOKS :**

1. Optics by Brij Lal and Subrahmaniam
2. Optics by Ajay Ghatak
3. Engineering Chemistry by Jain and Jain

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**SHEET FED OFFSET TECHNOLOGY-II****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****Delivery unit-**

spring gripper, pin type gripper, sprung pad gripper - compression spring, tension spring. Plate insertion system - tumbler gripper, rotary gripper. Sheet transfer section - chain transfer, single drum transfer, three drum transfer. skeleton wheels. Transfer drum. Sheet de curler. Sheet guiding device blow downs. Air cushion transfer drum. Slow down mechanisms. Anti set-off spray equipments. Extended deep pile delivery. Continuous delivery. Metered powder supply. Electrostatic system.

**Unit - II****Printing unit:**

Introduction. Cylinder gears - spur gear, helical gear, bevel gear. Cylinder design. Plate cylinder - cylinder driving, cylinder body, cylinder gap, plate clamping, plate punching, bearer contact cylinder, bearer gap cylinder. Plate mounting. Determining packing requirements, Packing material, problems due to improper packing. Blanket cylinder - Introduction, functions, manufacture, selecting grade of blanket performance requirement. Types of blanket. Blanket squaring. Blanket punching. Mounting the blanket. Recovering from blanket smash. Use of slightly damaged blanket. Care of blanket, blanket cleaning device. Impression cylinder.

**Unit - III****Process of printing operation:**

Pre make ready, make ready, inspection of press sheets, control of press function during press run - maintaining the inking system, maintaining the dampening system, the feeder, the delivery. Colour sequence in two colour and multicolour operations. Printability & runnability. Wet-on-wet printing. Wet-on-dry printing. Direct imaging presses. Quality control during the press run - Densitometry, colour control bars, press room lighting and standard viewing conditions, plate scanner. Printing unit problems. Proof press - requirements & advantages, progressive proof.

**Unit - IV****Requirements and Needs Of Machine Room Conditions:**

Machine room temperature ,Relative humidity, Sources of light ,ventilation, Space, and other requirements

**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.**

**MANUFACTURING PROCESS****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: Introduction to Manufacturing Processes and their Classification. Industrial Safety; Introduction, Types of Accidents, Causes and Common Sources of Accidents, Methods of Safety, First Aid.

Engineering Materials: General Properties and Applications of Engineering Materials, Mild Steel, Medium Carbon Steel, High Carbon Steel, High Speed Steel and Cast Iron.

**Unit-II**

Foundry: Introduction to Casting Processes, Basic Steps in Casting Process, Pattern, Types of Patterns, Pattern Allowances, Risers, Runners, Gates, Moulding Sand and its composition, Sand Preparation, Molding Methods, Core Sands and Core Making, Core Assembly, Mold Assembly, Melting ( Cupola) and Pouring, Fettling, Casting Defects and Remedies.

**Unit-III**

Cold Working ( Sheet Metal Work ): Sheet Metal Operations, Measuring, Layout Marking, Shearing, Punching, Blanking, Piercing, Forming, Bending and Joining Advantages and Limitations.

Hot Working Processes: Introduction to Hot Working, Principles of Hot Working Processes, Forging, Rolling, Extrusion, Wire Drawing. Plant Layout, Objectives of Layout, Types of Plant Layout and their Advantages.

**Unit-IV**

Introduction to Machine Tools: Specifications and Uses of commonly used Machine Tools in a Workshop such as Lathe, Shaper, Planer, Milling, Drilling, Slotter, Introduction to Metal Cutting. Nomenclature of a Single Points Cutting Tool and Tool Wear. Mechanics of Chips Formations, Type of Chips , Use of Coolants in machining.

Welding: Introduction to Welding, Classification of Welding Processes, Gas Welding: Oxy-Acetylene Welding, Resistance Welding; Spot and Seam Welding, Arc Welding: Metal Arc, TIG & MIG Welding, Welding Defects and Remedies, Soldering & Brazing.

**REFERENCE BOOKS:**

1. Workshop Technology Vol. I &II - Hazra & Chaudhary, Asian Book Comp., New Delhi.
2. Process and Materials of Manufacture-Lindberg, R.A. Prentice Hall of India, New Delhi.
3. Principles of Manufacturing Materials and Processes- Campbell, J.S.- McGraw- Hill.
4. Manufacturing Science-Amitabha Ghosh & Ashok Kumar Malik, - East-West Press.
5. Manufacturing Process and Systems - Ostwald, Munoz , John Wiley.
6. Workshop Technology, Vol. 1, 2 & 3 – Chapman, WAJ, Edward Arnold.

**ELECTRICAL SYSTEMS IN PRINTING MACHINES****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**

**D.C. Generator & Motor :** Construction ; types, series, shunt, compound E.M.F. equation, Building up of E.M.F. in shunt generator, Significance of residual magnetism, Generation characteristics.

**Motor** types, Principles of operation, Significance of back e.m.f., Torque equation, Torque-speed characteristics of series, shunt and compound motors, speed control of d.c. motors by armature resistance, Flux control and thyristor control method applications.

**Single Phase Motors :** Types, single phase induction motor Principles of operation of induction-motor , Repulsion motor, A.C. series motor, Application.

**Measurement of power in Three phase circuit by three wattmeter method, Two Wattmeters method, Single Wattmeter method.**

**Unit-II**

**Three Phase Induction Motor :** Basic principle of operation, cause of rotating rotor, Slip frequency of rotor current, Relation between torque and rotor power factor, starting Torque for squirrel cage Induction motor, Starting torque for slip ring induction motor, Condition for maximum torque, Effect of rotor resistance on torque, torque-slip characteristics, Different type of starters. Applications of 3 phase induction motor, Circle diagram

**Unit-III**

**Electrolytic Processes :** Introduction, Electrolyted, ionisation, Definition of various terms used in electrolysis, Faradays' laws of electrolysis, Extraction of metals, Refining of metals, electro deposition, power supply for electrolytic processes.

**Illumination :** Introduction, Nature of light, Units, Luminous efficiency glare, Production of light : Light production by excitation, Ionisation, Incandescence.

Distribution and control of light : Reflection, Refraction, Diffusion, Applications of directional controlled lighting, Production of coloured light, subtractive coloured light, Production with the discharge lamps, coloured reflectors, Lighting calculations : Plane angle, solid angle, solid angle in terms of plane angle.

#### Unit-IV

**Electric Welding & heating** : Principle, Resistance welding, Arc welding, Automatic hydrogen, A.C. & D.C. welding, welding transformer.

Introduction, Resistance heating, Direct resistance.

**Consideration and selection of electric motor for different industrial drives.**

**Recommended Books :-**

Elements of Electrical Engg. By B.L. Theraja, Vol. I, II

Industrial Training (PT-410)

Students will undergo for 4 weeks Industrial Training after exams in summer vacation



**COMPUTER GRAPHICS****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-1****Basic Concept:**

Introduction, The origin of computer graphics, Working of interactive - graphics display, New display devices, General purpose graphics software, The user-interface, Display of solid objects, Line drawing displays - Display devices and controllers, Display devices,

**UNIT-II****The CRT-**

Electron guns, Deflection system, Phosphors, Beam penetration CRT, Shadow mask CRT. Inherent-memory, devices - Direct view storage tube, Plasma panel, Laser-scan display, The storage-tube display, The refresh line - drawing display. Two dimensional transformations, Transformation principles, CAD, Animation, Simulation. Techniques for achieving realism

**UNIT-III**

**Basics of Digital image processing:** Introduction. Digital image representation, basic steps of image processing, elements of image processing system - image acquisition, storage, processing, communication, display.

**UNIT-IV**

**Fundamental concepts of digital image processing** - introduction, objectives, visual perception - structure of human eye, image formation in the eye, brightness adaptation and discrimination.

**Recommended Books:**

Computer graphics principles & practice 2nd edition - **Van Dam, Foley, Fiener Hughes.**  
Principle of Interactive Computer Graphics 2nd edition - **William N. Newman, Robert S.Sprull.**  
Computer graphics - **Hearn & Backer.**  
Procedural elements for computer graphics - **David F. Rogers.**Digital imaging techniques (Block I)  
Digital Imaging techniques (Block II)  
Digital image processing - **Gonzalez, Woods, Chanda,**  
Digital image processing and analysis –**Majumdar**  
Digital image processing and computing- **Schalkoff**

**411**  
**SHEET FED OFFSET TECHNOLOGY (LAB)-II**

**Time: 3 Hours**

**Max. Marks: 75**

**(25+50)**

**LIST OF EXPERIMENTS**

1. Two colour printing.
2. Four colour printing.
3. Effect of ink and water on the print quality-use of densitometer.
4. Effect of impression pressure on print quality-use of feeder gauge.
5. Effect on colour sequence on print quality-transparency and opacity of inks.
6. Ink trapping and back trapping- effect of tack, printing speed, ink film thickness.
7. Printing a second colour on a printed sheet problems involved and overcoming them, adjustment of lays, change of packing etc.

**412**  
**MANUFACTURING PROCESS (LAB)**

**Time: 3 Hours**

**Max. Marks: 75**

**(25+50)**

**LIST OF EXPERIMENTS**

1. To study different types of measuring tools used in metrology and determine least counts of vernier calipers, micrometers and vernier height gauges.
2. To study different types of machine tools ( lathe, shape or planer or slotter, milling, drilling machines )
3. To prepare a job on a lathe involving facing, outside turning, taper turning, step turning, radius making and parting-off.
4. To study different types of fitting tools and marking tools used in fitting practice.
5. To prepare lay out on a metal sheet by making and prepare rectangular tray, pipe shaped components e.g. funnel.
6. To prepare joints for welding suitable for butt welding and lap welding.
7. To perform pipe welding.
8. To study various types of carpentry tools and prepare simple types of at least two wooden joints.
9. To prepare simple engineering components/ shapes by forging.
10. To prepare mold and core assembly, to put metal in the mold and fettle the casting.

**413**  
**ELECTRICAL SYSTEMS IN PRINTING MACHINES- LAB**

**Time: 3 Hours**

**Max. Marks: 75**

**(25+50)**

**LIST OF EXPERIMENTS**

1. To study constructional parts of DC Machines.
2. To study magnetization characteristics of DC Generator.
3. To study speed control of DC motor by armature control method and field control method.
4. To measure three phase power by two watt meter method.
5. To study constructional parts of three phase induction motor.
6. To study torque –slip characteristics of three phase induction motor.
7. To study various types electric welding.

**414**  
**COMPUTER GRAPHICS LAB**

**Time: 3 Hours**

**Max. Marks: 75**

**(25+50)**

**LIST OF EXPERIMENTS**

1. Introduction to computer graphics, scope and limitations.
2. CorelDraw, different facilities available, working in CorelDraw environment.
3. Introduction to illustrator-simple lines, stylish lines, drawing and filling of images, gradation tools, blenders pattern with a difference, filling rectangular and non rectangular shapes of pallets and colour, system matrices, justifying text and application of path finder's.
4. Introduction to Photoshop-how you can differentiate it from illustrator, different types of the formats, their compatibility to different software, introduction of tool box, uses of different filters, masking and working on images, creating a presentation using software.
5. Quark express: PageMaker up, formatting and editing in the software.
6. Flash: Introduction of 2-D animations, study of tool box, menu bar, how you can use them in your industry, how you can create different effects like moving on selected path, masking of images etc

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**INDUSTRIAL VISITS/EXHIBITION****Max. Marks: 50**

Student has to submit a visit report on a assigned work by his/her concerned teacher & the report will be evaluate by the examiner appointed by Director/Chairperson.