

Scheme & Syllabus for B.Tech in Printing and Packaging Technology according to Choice Based Credit System (CBCS)

(Semester VII and Semester VIII)

Department of Printing and Packaging
Technology
w.e.f. Session 2021-22



School of Engineering & Technology
CENTRAL UNIVERSITY OF HARYANA
MAHENDERGARH-123031
HARYANA

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Central University of Haryana
School of Engineering and Technology
Department of Printing and Packaging Technology
B.Tech. 4th YEAR (SEMESTER – VII)

S. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	BT PPT701A	Print Entrepreneurship	3	0	0	3
2	BT PPT702A	Minor Project	0	0	10	5
3	BT PPT703A	Summer Internship Presentation	0	2	0	2
4	Program Elective-4 (Any one)					
	BT PPT704A	Book Publishing	3	0	0	3
	BT PPT705A	Printing Ink Technology	3	0	0	3
5	Program Elective-5 (Any one)					
	BT PPT706A	Packaging Machineries and Processes	3	0	0	3
	BT PPT707A	Paper Substrate in Packaging	3	0	0	3
6	Program Elective-6(Any one)					
	BT PPT708A	Hybrid Printing Technology	3	0	0	3
	BT PPT709A	Printing Organization and Plant Layout	3	0	0	3
Total			12	2	10	19

L = Lecture, T = Tutorial, P = Practical, & C = Credits

Central University of Haryana
School of Engineering and Technology
Department of Printing and Packaging Technology
B.Tech. 4th YEAR (SEMESTER – VIII)

Group A

S. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	BT PPT801A	Major Project	0	0	20	10
2	Program Elective – 7 (Any one)					
	BT PPT802A	Quality control & Waste Management	3	0	0	3
	BT PPT803A	Packaging of Industrial and Hazardous Goods	3	0	0	3
3	Program Elective – 8 (Any one)					
	BT PPT804A	Food and Pharmaceutical Packaging	3	0	0	3
	BT PPT805A	Industrial Packaging	3	0	0	3
4	GEC		3	1	0	4
Total			9	01	20	20

L = Lecture, T = Tutorial, P = Practical, & C = Credits

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Group B

S. N o.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	BT PPT809A	Industry Internship	NA	NA	NA	17
	GEC-Online		3	0	0	3
Total			3	0	0	20

L = Lecture, T = Tutorial, P = Practical, & C = Credits

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B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: B. Tech Printing and Packaging Technology

Course Code: BT PPT701A	Course Name: Print Entrepreneurship	L	T	P	C
		3	0	0	3
Year and Semester	4th Year 7th Semester	Contact hours per week: (3 Hrs.)			
Prerequisite of course	Management	Evaluation			
		CIE: 30		TEE: 70	
Course Level Learning Outcomes: On completion of the course, student would be able to:					
<ul style="list-style-type: none"> • Explain Entrepreneurship. • Outline the new business start methods. • Discuss types of business & plans of business. • Describe different forms of ownership & entrepreneurship development. 					
Unit	COURSE SYLLABUS				
1	Entrepreneurship: Definition, Types of Entrepreneurs, qualities and pre-requisites of entrepreneur, Entrepreneurship spirits, Significance of entrepreneur in Economic Development, Economic, social and psychological need for entrepreneurship, Identifying & Evaluating Business opportunities.				
2	Quick Start Method: Methods and Procedures to start and expand one's own business, Franchises, creating your own franchise, Multi-Level marketing schemes, Buying an existing business.				
3	Business Planning Process: Requirement of good business plan .Business Plan-the major benefits, sub plan, Business plan-blueprint to success and financing, Small manufactures business plan, Feasibility Report, Project Reports.				
4	Forms of Ownership: Different forms of ownership-sole proprietorship, partnership, joint stock company, Selling, Selling your venture, planning for succession, Valuation of a business, Responsibility of a good employer, Risk management, Entrepreneurship development Programmes, Role of Govt. and promotional agencies in entrepreneurship development.				

Suggested readings:

1. B Janakiram, *Management & Entrepreneurship*, Excel book India, 2010.
2. B Janakiram, *Entrepreneurial Development*, December 2007.
3. Jasmer Singh Saini, *Entrepreneurship Development Programmes & Practices*, Deep and Deep Publications, 2002.
4. Jose Paul, N. Ajith Kumar, *Entrepreneurship Development & Management*, Himalaya Publishing House, 2000
5. Tata McGraw-Hill, *Entrepreneurship Development* - Colombo Plan Staff College for Technician Education, 1998

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B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: B. Tech Printing and Packaging Technology

Course Code: BT PPT702A	Course Name: Minor Project	L	T	P	C
		0	0	10	5
Year and Semester	4th Year 7th Semester	Evaluation			
Prerequisite of course	Nil	CIE: 45		TEE: 105	

B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: B. Tech Printing and Packaging Technology

Course Code: BT PPT703A	Course Name: Summer Internship Presentation	L	T	P	C
		0	2	0	2
Year and Semester	4th Year 7th Semester	Evaluation			
Prerequisite of course	Knowledge of printing processes	CIE: 30		TEE: 70	
Report of summer internship will be evaluated by a committee duly constituted by the HOD/Dean.					

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B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: B. Tech Printing and Packaging Technology

Course Code: BT PPT704A	Course Name: Book Publishing	L	T	P	C
		3	0	0	3
Year and Semester	4th Year 7th Semester	Contact hours per week: (3 Hrs.)			
Prerequisite of course	Basics of design and management	Evaluation			
		CIE: 30		TEE: 70	
Course Level Learning Outcomes: On completion of the course, student would be able to:					
• Describe the basic knowledge of book publishing houses.					
• Explain the structure of press organization.					
• Discuss the marketing & distribution in book publishing.					
• Write the legal aspects in book publishing.					
Unit	COURSE SYLLABUS				
1	Definition and concept, parts of a book, basic steps in book publishing, areas of publishing - general publishing, educational publishing, professional publishing and reference publishing house - the role of commissioning editor, the desk editor, the designer, the production manager, the sale/marketing manager, the publicity manager, the warehouse or distribution department, the accounts department, the management.				
2	Press Organization Hierarchy - editorial organization, mechanical aspects of organization - composition, printing, basic operations business aspects of organization, flowcharts of staff in organization, Circulation and Advertisement departments, distribution channels.				
3	Marketing and Distribution in Book Publishing Home market, export market, closed market, advertising and publicity, types of distribution, conventional and modern channels of distribution. International book trade and barriers. Import and export of books. Relationship of the Editor with the manuscript. Evaluation procedures. External review and its associated problems. Editorial Organization in Publishing The editorial functions in newspapers, journals, magazines and books.				
4	Legal Aspects in book Publishing Copyright, types of agreement between author and publishers, the outright sale of the copyright, profit sharing agreement, the royalty system, commission agreements The press and the law-libel, defense against libel, mitigation & damages.				

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Suggested readings:

1. Sinha & Sinha, *Computer Fundamentals: Concepts, Systems & Applications*, BPB Publications; 6th edition (30 November 2004).
2. Hugh Speirs, *Introduction to Prepress*, Pira International (January 1, 2003).
3. Winn L. Rosch, *Hardware Bible, QUE*; 6th edition (21 February 2003).
4. Adobe Creative Team, *Adobe PageMaker 6.5 Classroom in a Book*, Adobe; Pap/Cdr edition (16 May 1997).
5. David Bergsland, *Printing in a Digital World*, Delmar Cengage Learning; 1st edition (21 September 1996).
6. Frank J. Romano, *Desktop Typography with QuarkXPress*, TAB Books Inc; 2nd edition (1 December 1992).






B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: B. Tech. - Printing and Packaging Technology

Course Code: BT PPT705A	Course Name: Printing Ink Technology	L	T	P	C
		3	0	0	3
Year and Semester	4th Year 7th Semester	Contact hours per week: (3 Hrs.)			
Prerequisite of course	Basics of printing inks	Evaluation			
		CIE: 30		TEE: 70	
Course Level Learning Outcomes: On completion of the course, student would be able to:					
<ul style="list-style-type: none"> • Describe various ingredients and vehicles used in printing ink. • Discuss drying mechanisms used for ink drying. • Explain ink requirements for various printing processes. • Discuss security inks and various tests for printing ink. 					
Unit	COURSE SYLLABUS				
1	Introduction, solvent based inks, water based ink, ingredients in Ink- pigments properties, types, carbon black, inorganic pigments, organic pigments, physical characteristics of organic pigments. Vehicles- vehicles for liquid inks, vehicles for paste inks, UV curing vehicles. Additives - driers, extenders, anti-oxidants, waxes. Oils- vegetable drying oils, semi drying oils, non-drying oils.				
2	Drying mechanisms - physical drying mechanisms, absorption drying, evaporation drying, chemical drying systems, oxidation polymerization drying, radiation drying and curing, microwave drying, infrared drying. Viscosity - Newtonian flow, units of viscosity, viscosity & temperature, factors influencing viscosity, simple low viscosity inks, complex high viscosity inks. Ink requirements for printing processes.				
3	Ink requirements for printing processes – offset, letterpress, flexography, gravure, screen printing. Optical properties of ink films, rheology and ink transfer requirements, ink distribution and transfer on the press, method for the direct measurement of ink setting on coated paper. Paste inks - single roll mill, twin roll mill, triple roll mill, ball mill, twin horizontal mixer, uni-roll mill, high speed stirrer milling. Liquid inks - ball mill, pearl mill, sand mill, bead mill, shot mill. Trends and developments in the ink manufacturing process.				
4	Security Inks: Range of security inks, special security features - fluorescence, phosphorescence, reflected by improved filters, magnetism, security printing inks for cheques. Tests for chemical resistance, light fastness, rub resistance test, crumpling resistance test, grinding control, color control, control of the rheological properties, control of drying time, control of various specific properties. Introduction to Nano inks.				

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Suggested readings:

1. Krishan Kumar Aggarwal, *Complete Printing Inks Industries*, Creative publication, 2018.
2. Alfred Seymour, *Modern Printing Inks: A Practical Handbook for Printing Ink Manufacturers and Printers*, Forgotten Books, 2018.
3. NIIR Board, *the Complete Technology Book on Printing Inks*, Asia Pacific Business Press Inc., 2018.
4. Robert Leach, Ray Pierce, *The Printing Ink Manual*, Springer; 4th Edition, 1999 edition (30 September 1993).


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B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: B. Tech. - Printing and Packaging Technology

Course Code: BT PPT706A	Course Name: Packaging Machineries and Processes	L	T	P	C
		3	0	0	3
Year and Semester	4th Year 7th Semester	Contact hours per week: (3 Hrs.)			
Prerequisite of course	Basics of packaging materials	Evaluation			
		CIE: 30		TEE: 70	
Course Level Learning Outcomes: On completion of the course, student would be able to:					
<ul style="list-style-type: none"> • Describe manufacturing process of metal cans. • Discuss different packaging machineries used for line operations and systems. • Explain various machineries used for conversions of different packaging materials. • Outline the filling machine required for the line operations. 					
Unit	COURSE SYLLABUS				
1	Introduction and Manufacturing Metals Cans & Drums: Introduction, Machineries used for conversion, online packaging, Ancillaries Machines and equipment, Online and Offline inspection equipment. Metal Cans-Three piece, can manufacturing machine and its various sections-Coating Equipments. Metal drum-Types-Different machines used in manufacturing.				
2	Machineries for Manufacturing of Sacks, Flexible Laminates & Corrugated Box: Sacks-Types-Machine used in manufacturing of bags. Folding Cartons -Types of Cartons-Machine used in carton manufacturing. Flexible Laminates-Types of lamination techniques-Different components of the Lamination Machine. Corrugated Box-Board construction-Machine used in manufacturing.				
3	Wrapping Machines & Equipments: Wrapping Machine-Style of wrapping-Machines used, Shrink Wrapping Machine-Machine types and its parameters, Stretch Wrapping Machine-Pre-stretching film-Types of Wrapper models.				
4	Types of fillers, VFFS, HFFS and Multiwall Sack filling: Filling machineries by count-Filling machineries-Liquid-Carbonated, Design consideration and selection of fillers. Types of Solid fillers. Vertical Form fill seal (VFFS), Horizontal Form fill seal (HFFS) Machines- Machine overview, and Types-Different section on the machine-New technologies available. Multiwall bag-Types of filling technique.				

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Suggested readings:

1. Shrikant P. Athavale, *Handbook of Printing, Packaging and Lamination: Packaging Technology*, Notion Press; 1st edition (12 September 2018).
2. F Joseph Hanlon, *Handbook of Package Engineering*, McGraw-Hill, 2016.
3. Soroka, Walter, *Fundamentals of Packaging Technology*, Institute of Packaging, Professionals, St. Charles, IL (2014).
4. Anne Emblem, *Packaging Technology: Fundamentals, Materials and Processes*, Wood head Publishing; 1st edition (29 October 2012).
5. John Henry, *Packaging Machinery Handbook: The Complete Guide to Automated Packaging Machinery Including Packaging*, Create Space Independent Pub. (17 November 2012).
6. Richard Crowson, *Assembly Processes, Finishing, Packaging, and Automation*, CRC Press, January 13, 2006.
7. Jeffrey H. Hooper, *Confectionery Packaging Equipment*, Springer; 1999th edition (30 September 1998).

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B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: B. Tech Printing and Packaging Technology

Course Code: BT PPT707A	Course Name: Paper Substrate in Packaging	L	T	P	C
		3	0	0	3
Year and Semester	4th Year 7th Semester	Contact hours per week: (3 Hrs.)			
Pre-requisite of course	Basics knowledge of paper	Evaluation			
		CIE: 30		TEE: 70	
Course Level Learning Outcomes: On completion of the course, student would be able to:					
• Describe raw materials used in paper.					
• List of various pulping processes.					
• Explain paper making processes.					
• Discuss various properties of paper.					
Unit	COURSE SYLLABUS				
1	Raw Materials and Preparation: Fibrous raw materials –Soft and Hard Wood, Wood structure and morphology, Non wood fibers and recycled paper, Non fibrous Additives, Sizing Agents, Binders, Fillers and Additives, Wood harvesting, logging, sorting, Debarking, Chipping, Screening & Storage.				
2	Pulping: Types- Mechanical, Chemical and semi-chemical- Mechanical pulping, Stone ground wood, pressurized grinding, Refiner pulping, refiner plates, Assisted mechanical pulping, thermo mechanical, chemi-mechanical, chemithermo-mechanical, Chemical pulping- Kraft and Sulfito – Pulping Chemistry - Liquor Chemicals and reactions- Digester Temperature and Pressure - Chemical recovery and environmental effects- Pulp properties – Processing of pulp for paper making.				
3	Paper Making: Preparation of pulp – Repulping/dispersion, Beating and Refining, Bleaching, Recycled paper – Deinking, Washing and Flotation Foudrinier Paper Machine- Dry and Wet end operations- Surface treatments- Sizing, Coating and Super calendaring.				
4	Paper properties: Optical properties – Color, brightness, smoothness, gloss, opacity and rub resistance, Strength properties–thickness, grammage, tensile, tear, bursting strength, stiffness, Grain direction, Wire and Felt sides. End use property testers – Abrasion, compression, crush resistance.				

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Suggested readings:

1. Herbert Holik, *Hand book of Paper and Board*, Wiley-VCH, 2006.
2. Mark J. Kirwan, *Paper and paperboard Packaging Technology*, Blackwell Publishing, 2005.
3. Herbert Sixta, *Handbook of Pulp*, Vol.1, Wiley-VCH, 2005.
4. G.A. Smook, *Handbook for pulp and paper technologists*, Angus Wilde Publications, 2001.






B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: B. Tech Printing and Packaging Technology

Course Code: BT PPT708A	Course Name: Hybrid Printing Technology	L	T	P	C
		3	0	0	3
Year and Semester	4th Year 7th Semester	Contact hours per week: (3 Hrs.)			
Prerequisite of course	Digital and conventional printing	Evaluation			
		CIE: 30		TEE: 70	
Course Level Learning Outcomes: On completion of the course, student would be able to:					
• Overview of Printing Methods and Technologies					
• Describe concept of Hybrid Printing and its application.					
• Describe Hybrid Printing Systems combining Conventional Printing Technologies					
• Understand in-line and off-line print production.					
Unit	COURSE SYLLABUS				
1	Overview of Printing Methods and Technologies, Combination Variants of Hybrid Printing Systems.				
2	System Concepts and Examples of Implementations. Hybrid Printing Systems combining Conventional Printing Technologies, Hybrid Printing Systems combining NIP Technologies.				
3	Hybrid Printing Systems combining Conventional and NIP Technologies, Hybrid Printing Systems combining Computer to Press/Direct Imaging with NIP Technologies, Hybrid Printing Systems combining Conventional Printing Technologies with Computer to Press Technologies.				
4	Hybrid Techniques for In-line Print Production, Hybrid Techniques for Off-line Print Production.				

Suggested readings:

1. Michael Limburg, *Gutenberg goes digital: All You Need to Know about Computer to Plate Technology*, Blue Print, 2012
2. David Bann, *the All New Print Production Handbook*, Rotovision, 2011.
3. Bergsland, David, *Introduction to digital publishing*, Cengage Learning, 2002.
4. Kipphan, Helmut, ed. *Handbook of print media: technologies and production methods*, Springer Science & Business Media, 2001.
5. Phil Green, *Understanding Digital Color*, 2nd edition, printing Industries, 1999.
6. Robin McAllister, *Scanning and Image Manipulation*, Delmar Cengage Learning, 1996.
7. Anton & Peter Kammermeier, *Scanning & Printing*, Focal Press, 1992.

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B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: B. Tech. - Printing and Packaging Technology

Course Code: BT PPT709A	Course Name: Printing Organization and Plant Layout	L	T	P	C
		3	0	0	3
Year and Semester	4th Year 7th Semester	Contact hours per week: (3 Hrs.)			
Prerequisite of course	Basics of management	Evaluation			
		CIE: 30		TEE: 70	
Course Level Learning Outcomes: On completion of the course, student would be able to:					
<ul style="list-style-type: none"> • Describe print organization and management. • Discuss strategic issues of location. • Explain methods and types of plant layout. • Outline of factory building and its types. 					
Unit	COURSE SYLLABUS				
1	Printing Organization: Management- Nature scope and importance of Management, Functions of Management –Scientific, Management. Production and operations Management – Locations and Layout of plant, Maintenance management Structure: Structure of organization, Formal and Informal organization, Market research, Sales promotion and Purpose of business management. Workflow and organizational structure in a printing press.				
2	Strategic issues of location. The supply-distribution system, Dynamic nature of plant location, strategy-factors influencing choice of location. State regulations on location. Backward areas and Industrial policy. Govt. Policies for decentralization, Industrial estates, comparison of locations-urban v/s rural areas advantages, sub-urban area. Economic survey of site selection. Analytical approach.				
3	Objectives of good plant layout, principles of plant layout, importance of plant layout, situations in which layout problems may arise, factors influencing plant layout, Methods of plant and factory layout. Types of plant layout -product layout or live layout - process layout or functional layout-combination layout. Symptoms of bad layout. Flow pattern-line flow, L type flow, circular flow, U type flow, Characteristics and place of application. Factors governing flow patterns: Combination of line flow and S type of pattern. Combination of line flow and circular type. Work station design-Storage Space Requirements.				
4	Introduction, Advantages of a good factory building, Factors affecting the factory building - nature of manufacturing process- flexibility-expandability-service facilities-employee facilities-lighting-heating- ventilating-air conditioning-appearance- durable construction-security measures- noise control. Types of factory building - single story building, high bay and monitor type buildings, multi-story buildings, building of special types. Types of construction of factory building: Wood frame construction, Brick construction, Slow burning mill construction.				

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Suggested readings:

1. NIIR Board of Consultants & Engineers, *The Complete Book on Printing Technology with Process Flow Diagrams, Plant Layouts and Machinery Details (Offset, Gravure, Flexographic, Security, Web Offset and Pad Printing)*, 2nd Revised Edition, 1 January 2019.
2. Gerard Blokdyk, *Organization design: Implement, Administer, Manage, Create Space Independent Publishing Platform* (September 24, 2017).
3. Jack Greene, *Plant Layout and Facility Planning: Edition Two*, Create Space Independent Publishing Platform; 2nd edition (September 15, 2013).
4. Charles Conover, *Designing for Print: An In-Depth Guide to Planning, Creating, and Producing Successful Design*, Wiley; 2nd edition (25 November 2011).
5. A. John Geis, *Printing Plant Layout and Facility Design, Printing Industries Pr*; 3rd edition (1 May 2010).






B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

(Group A)

Program Name: B. Tech Printing and Packaging Technology

Course Code: BT PPT801A	Course Name: Major Project	L	T	P	C
		0	0	20	10
Year and Semester	4th Year 8th Semester	Evaluation			
Prerequisite of course	Nil	CIE: 90		TEE: 210	

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B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: B. Tech. - Printing and Packaging Technology

Course Code: BT PPT802A	Course Name: Quality Control & Waste Management	L	T	P	C
		3	0	0	3
Year and Semester	4th Yr. 8th Semester	Contact hours per week: (3 Hrs.)			
Prerequisite of course	Basics of Management	Evaluation			
		CIE: 30		TEE: 70	
Course Level Learning Outcomes: On completion of the course, student would be able to:					
• Describe the quality and its functions.					
• Discuss the environmental impact of printing and packaging industry.					
• List of ISO series.					
• Explain various quality aspects on packages.					
Unit	COURSE SYLLABUS				
1	Definition of Quality, Quality control, its meaning, objective, and functions, Quality Cost, economic consideration, Quality Assurance, Comparative study of quality control and quality assurance, Benefits of Quality Control in Printing Industry, TQM, Quality Circles.				
2	Solid, Liquid and Gaseous wastes in printing and packaging organizations, Environmental impact of printing and packaging industry, SWOT Analysis, wastage reduction in printing and packaging industries. Green protocol and green printing concepts.				
3	Establishing Quality control programme in different departments of Printing organization. Introduction to ISO: 9000 and ISO: 14000 series. Environment Management system, QMS and EMS, Paper and paper board testing instruments for testing printability, print quality and end-user requirements. ISO standards for Graphic technology- ISO 12647- Process Control for halftone color separation, Proof and production prints, ISO 16760:2014 – Prepress data exchange. ISO 16762 & 16763 for Post press, ISO 284b for Printing ink ISO/TC 130 for digital printing and ISO/TC 122 for packaging.				
4	Quality of packages, Press sheet control devices used for production of multi-color printing jobs, Basic principles of these instruments and devices how they function and what they measure, minimum instrumentation necessary to produce a product consistent with the appropriate quality level.				

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Suggested readings:

1. Amitava Mitra, *Fundamentals of Quality Control and Improvement*, Wiley; 4th edition (21 June 2016).
2. John Pichtel, *Waste management practices*, CRC Press; 2nd edition (31 March 2014).
3. U S Environmental Protection Agency, *Handbook: Quality Assurance/Quality Control (Qa/Qc) Procedures for Hazardous Waste Incineration*, Bibliogov (1 March 2013).
4. A.K. Bewoor V.A. Kulkarni, *Quality Control*, Wiley (1 January 2009).
5. George Tchobanoglous, Frank Kreith, U S Environmental Protection Agency, *Handbook of Solid Waste Management*, Second Edition, The McGraw-Hill Companies, Inc., 2002.






B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: B. Tech Printing and Packaging Technology

Course Code: BT PPT803A	Course Name: Packaging of Industrial and Hazardous Goods	L	T	P	C
		3	0	0	3
Year and Semester	4th Year 8th Semester	Contact hours per week: (3 Hrs.)			
Prerequisite of course	Basics of packaging	Evaluation			
		CIE: 30		TEE: 70	
Course Level Learning Outcomes: On completion of the course, student would be able to:					
• Describe the packaging of industrial products.					
• Discuss wood packaging forms.					
• Explain product protection methods.					
• Write packaging of chemical products.					
Unit	COURSE SYLLABUS				
1	Introduction & Classification: Introduction to industrial products packaging, difference between consumer and industrial packaging needs. The packaging Considerations and package design approach, protective requirements and distribution – hazards, their sensitivity influencing packaging design and development criteria Industrial Products Classification – Product Group Wise, Its Nature, Classification & Requirements; Heavy, Medium and Light Engineering Goods; Electronic Products; Auto Components/ Spares, Chemicals and others.				
2	Wood as Packaging Material: Classification of wood – Groups, softwood & hardwood, plywood Properties of wood – Density, Moisture Content Defects found in wood – Knots, Cross Grain, Cupping, checking and others. Introduction to Wood seasoning & Preservation. Wood Packaging Forms, Wooden Boxes & Crates – Difference & Types. Introduction to Wooden Pallets, Palletized Boxes & Box Pallets and their various components.				
3	Product Protection: Corrosion – Types and Preventive Methods, Introduction to Desiccants Cushioning – Concept, Fragility & Cushion Factor, Shock & Vibration. Open & Closed cell cushions and various cushioning Materials. Internal Fitments – Functions & Different Materials; Types of Internal Fitments - Corner supports, Pads, Liners/collars, Trays, Slotted Partitions and others. Concept of Reinforcement & Unitization. Bulk Carriers: Intermediate Bulk Containers (IBC) – Rigid & Flexible – Types, Materials of Constructions & Various designs. Corrugated Fibreboard Boxes, Paper Sacks, Jerry Cans, Fibre Drums and others.				
4	Packaging of Chemicals: Cement, Fertilizers, Pesticides/ Insecticides, Petroleum products etc., Alternate bulk Packaging systems and their applications and benefits. Functions of chemical Packaging, Recent developments in chemical packaging.				

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Suggested readings:

1. Marianne R. Klimchuk, Sandra A. Krasovec, *Packaging Design*, Wiley; 2nd edition (January 14, 2013).
2. Daniel Goodwin, Dennis Young, *Protective Packaging for Distribution: Design and Development*, DEStech Publications, Inc. (1 September 2010).
3. Joseph F.L. Robert S Keley, *Handbook of Package Engineering*, CRC Press, Published April 23, 1998.
4. F. A. Paine, *Fundamentals of Packaging*, Blackie and Son Ltd (January 1, 1962).
5. Friedman W.F. and J.J. Kipness, *Industrial Products packaging*, John Wiley & Sons, 1960.






B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: B. Tech. - Printing and Packaging Technology

Course Code: BT PPT804A	Course Name: Food and Pharmaceutical Packaging	L	T	P	C
		3	0	0	3
Year and Semester	4th Year 8th Semester	Contact hours per week: (3 Hrs.)			
Prerequisite of course	Basics of packaging	Evaluation			
		CIE: 30		TEE: 70	
Course Level Learning Outcomes: On completion of the course, student would be able to:					
• Describe barrier material for a specific food product based on barrier properties.					
• Explain food preservation techniques.					
• Discuss various characteristics of pharmaceutical drugs.					
• List cosmetic packaging materials & techniques.					
Unit	COURSE SYLLABUS				
1	Introduction to Food Packaging: An overview & Introduction to the science, technology, socio economic needs and packaging functions. Types of food – Perishable / Semi-perishable, acidity of food product. Gas and Vapor permeation - Basic concepts and theory of permeation and units. Barrier materials used in Food Packaging - Food-package compatibility and migration issues.				
2	Food Preservation Techniques: Drying – Cold Preservation (Refrigeration, Deep Freezing) – Pickling – Sterilization (Retort/Canning, Irradiation) Modified & Controlled Atmosphere Packaging – Gases used – Vacuum Packaging, Active Food Ingredients.				
3	Packaging of Drugs: Introduction, Classification, design guidelines. Packaging of Drugs - Injectable– Material used for drug packaging: Glass, Rubber, Plastic, Aluminum, paper and board.				
4	Cosmetic Packaging: Introduction, Classification, Factors affecting Cosmetics Packaging, Cosmetic packaging materials and Techniques.				

Shankar
Shankar



Sandeep
Tanuj

Arvind
Arvind

Suggested readings:

1. Dipak Kumar Sarkar, *Packaging Technology and Engineering: Pharmaceutical, Medical and Food Applications*. Wiley, September 2020.
2. Shrikant P. Athavale, *Handbook of Printing, Packaging and Lamination: Packaging Technology*, Notion Press; 1st edition (12 September 2018).
3. F Joseph Hanlon, McGraw-Hill, *Handbook of Package Engineering*, 2016.
4. Alexandru Grumezescu, *Food Packaging*, 1st Edition, Academic Press, 14th September 2016.
5. Soroka, Walter, *Fundamentals of Packaging Technology*, Institute of Packaging, Professionals, St. Charles, IL (2014).
6. Gordon L. Robertson, *Food Packaging: Principles and Practice*, Third Edition, CRC Press; 3rd edition (18 January 2013).
7. Edward J. Bauer, *Pharmaceutical Packaging*, CRC Press; 1st edition (25 March 2009).






B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: B. Tech Printing and Packaging Technology

Course Code: BT PPT805A	Course Name: Industrial Packaging	L	T	P	C
		3	0	0	3
Year and Semester	4th Year 8th Semester	Contact hours per week: (3 Hrs.)			
Prerequisite of course	Basics of packaging	Evaluation			
		CIE: 30		TEE: 70	
Course Level Learning Outcomes: On completion of the course, student would be able to:					
<ul style="list-style-type: none"> • Discuss the importance of bulk packaging. • Explain various packaging materials. • Describe new packaging products. • Discuss the various hazards in packaging. 					
Unit	COURSE SYLLABUS				
1	Introduction to packaging, meaning of Bulk Packaging, bulk packaging consideration, Product needs, Product weights. Difference between bulk packaging and retail, Application of bulk packaging, advantages and disadvantages.				
2	Bulk Packaging systems: Intermediate Bulk Containers (IBC) - Rigid IBC tanks, Flexible IBC Tanks, Designing, advantages, application, acquisition and disposal, safety, container costs, container types. Flexible Intermediate Bulk Containers (FIBC) - history, Electrostatic properties, Applications, uses of flood barrier, emptying FIBC. Woven sacks- Gunny sack, paper sack, plastic bags. Bulk Shrink Wrap- Introduction, Composition, and Manufacturing, application, Stretch Wrapping- Introduction, manufacturing, functions, Application- Manual, Semi-Automatic wrappers and Automatic wrappers.				
3	Material used in bulk packaging- LDPE, LLDPE, HDPE, PP, PVC, Nylon, Polyester Other materials like- Corrugated, Bags, Metals, Wood.				
4	Bulk Packaging for Hazardous Materials, Industrial packaging types. Selection of proper packaging for industrial product- Flexible industrial packaging paper and plastic, rigid industrial packaging wooden, metal and plastic.				

Shankar
Shankar



Sandip
Tanuj

Amir
Amir

Suggested readings:

1. Shrikant P. Athavale, *Handbook of Printing, Packaging and Lamination: Packaging Technology*, Notion Press; 1st edition (12 September 2018).
2. Walter-Soroka, *Fundamentals of packaging technology*, CPP; Institute Of Packaging Professionals, Published by Institute of Packaging Professional; 5th edition (January 1, 2014), 2014.
3. Fumi Sasada, Giles Murray, *the Eight Elements of Powerful Package Design*, November 19, 2013.
4. Kit L. Yam, *The Wiley Encyclopedia of Packaging Technology*, 3rd Edition, September 2009.






B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

(Group B)

Program Name: B. Tech Printing and Packaging Technology

Course Code: BT PPT809A	Course Name: Industry Internship	L	T	P	C
		NA	NA	NA	17
Year and Semester	4th Year 8th Semester	Evaluation			
Prerequisite of course	Nil	CIE: 150		TEE: 350	

Shankar
Shankar

Sandeep
Tanuj

Anil
Anil