Introduction to Packaging and Printing (BT PPT301)

Total Credit: 4
Max. Marks: 100
Theory: 70
Internal: 30
Time Allowed: 3 Hrs.

Unit: 1


Unit: 2

Letterpress process of printing: Introduction, Characteristics of letterpress printing, tools & equipment’s used in the letterpress department, classification of letterpress printing machines, Pre-make ready & make ready steps, letter press substrates, inks & image carrier.

Unit: 3


Unit: 4


Text Books
1. Handbook of Printing Processes (GATF publications) by Deborah L Stevenson (Author), Charles Lucas (Illustrator)
2. Printing Technology 5th edition, Publisher: Delmar, 2002
3. The Gutenberg Revolution: How Printing Changed the Course of History

Reference Books:
Fundamentals of Management (BT PPT302)

Total Credit: 2
Max Marks: 100
Theory: 70
Internal Assessment: 30
Time Allowed: 3hrs.

Unit – I

Unit - II
Production Management: Definition, Objectives, Functions and Scope, Production Planning and Control; its significance, stages in production planning and control. Brief introduction to the concepts of material management, inventory control; its importance and various methods.

Unit - III
Marketing Management - Definition of marketing, Marketing concept, objectives & Functions of marketing. Marketing Research - Meaning; Definition; objectives; Importance; Limitations; Process. Advertising - meaning of advertising, objectives, functions, criticism.

Unit - IV

Reference Books:
Package Design & Development (BT PPT303)

Total Credit: 4
Max. Marks: 100
Theory: 70
Internal: 30
Time Allowed: 3 Hrs.

Unit: 1
Introduction to “Graphic Design”: What is design, Graphic design, Printer’s design. Fundamentals of design: line, tone, value, weight, texture, shape, size, space, etc. Principles of design-balances, proportion, rhythm, unity, contrast, simplicity, fitness.

Unit: 2
Color theory: dimension of color, color schemes, color symbolism, and emotional effects of color. Methods of type arrangement, classification of typeface of font designing.

Unit: 3
Printing planning: rough layout, comprehensive, artwork, type of originals, sizing, masking and cropping, perspective, scale, sense of proportion. Design management: Definitions in advertising art, modern art abstract art, applied art, advertising, publicity, public relations, role of design in sale promotion.

Unit: 4
Design with D.T.P: Various software’s used for designing, House style, Good and bad copy, proofing stager; concept of impositions method of costing off.

Text Books:
Element of Packaging (BT PPT304)

Unit: 1

Unit: 2

Unit: 3

Unit: 4

Text Books:

1. The Big Book of Packaging by Mr. Sandeep Kumar Goyal

2. The Eight Elements of Powerful Package Design Paperback – November 19, 2013
   by Fumi Sasada (Author), Giles Murray
Printing Process Lab (BT PPT305)

Total Credit: 1
Max. Marks: 50
External: 35
Internal: 15
Time Allowed: 3 Hrs.

1. Identification of different tools & equipments used in various printing process.
2. Introduction of different printing process.
3. Schematic diagram of different printing processes.
4. Study of various types of Image carriers for different printing process.
5. Overview pre-make ready & make ready.
6. Study of different printing press.
7. Overview of machine production for multi color printing.
8. Study of running & printing faults on different printing process machine.

Package Design & Development Lab (BT PPT-306)

Total Credit: 1
Max. Marks: 50
External: 35
Internal: 15
Time Allowed: 3 Hrs.

1. Folders- Single fold & Double fold.
2. Sticker- Two Colours.
3. Label designing- 2 and 4 colours.
4. Introduction to computer, various softwars’s used for designing purpose Demonstration (Manipulation of same design).
5. Logo designing on computers.
6. Knowledge of different computer commands.

GEC (To be taken from other Departments)

List of GEC (General Elective Course)
“For students of other Departments”
BT PPT307 (Packaging Legislations)
BT PPT 303 (Package Design and Development)
BT PPT 306 (Package Design and Development Lab)
BT PPT308 (Printing and Packaging Materials Science)
BT PPT 309 (Printing and Packaging Materials Science Lab)
UNIT – I
INDIAN REGULATORY SYSTEM - Introduction, The Standards of weights and Measures Act (SWMA), Standard Units, Laws, Regulations and Ministries involved, Essential Commodities Act, Agricultural Produce (Grading and Marketing) Act, Prevention of Food Adulteration Act, Codex Standard Act, Export (Quality Control and Inspection) Act, Bureau of Indian Standards

UNIT - II
DECLARATIONS ON PACKAGED COMMODITIES - Declarations for Interstate Trade and Commerce, Standard Packages, Maximum Permissible Error, Label Declarations, Standard Quantity specifications for various products, Symbols and Units used

UNIT – III
INTERNATIONAL LAWS AND VIOLATION OF LAW - Uniform Weights and Measures Law, Uniform Packaging and Labeling Regulation (UPLR), Uniform Unit Pricing Regulation (UPR), Details of Violations, offences, Penalties under various sections, EU-REACH Regulations in packaging.

UNIT - IV
PACKAGING STORAGE REQUIREMENTS - Various storage requirements of Products, Specifications of Raw Materials used, IS Specifications with respect to packaging and Packaging Materials, Packaging requirements under PFA, Declaration and Labeling, Specification of Display panels, Statutory Requirements on Packages, PFA Enforcement methods, Fruit Products Order (FPO), Meat Food Products Order (MFPO), Agricultural Grading and Marking Rules (AGMARK), Edible Oil Packaging (Regulatory) Order

REFERENCES
2. The Standards of Weights and Measures act, (1976) & Standards of Weights
Unit: 1


Unit: 2

Unit: 3

Unit: 4

Reference Books:
1. Fundamentals of Packaging Technology 3rd Edition by Walter Soroka (Author)
3. Optics by Brij Lal and Subrahmaniam
4. Optics by Ajay Ghatak
5. Engineering Chemistry by Jain and Jain
8. Printing Surface Preparation by C. S. Mishra
Printing and Packaging Materials Science Lab (BT PPT309)

Total Credit: 1
Max. Marks: 50
   External: 35
   Internal: 15
Time Allowed: 3 Hrs.

1. To determine pH of Ink.
2. Study of different kinds of light sensitive materials used for printing image.
3. Light Fastness test of paper.
4. Study of different kinds of papers and paperboard used in printing and packaging.
5. Study of inks used in printing and Ink tackiness test.
6. Study of coating materials used in printing and packaging.
7. Study of adhesives and tapes used in printing and packaging.
Fundamentals of Gravure Technology (BT PPT401)

Total Credit: 4
Max. Marks: 100
Theory: 70
Internal: 30
Time Allowed: 3 Hrs.

Unit: 1

Unit: 2

Unit: 3

Unit: 4

REFERENCES
Introduction to Graphic Imaging (BT PPT402)

Unit: 1
Basic principles of reproduction photography: line photography; Basic density range of line original Basic line exposure for computerized camera with on-line densitometer, equipment’s and accessories. Difficult line originals. Evaluation of film elements. Halftone photography- selection of screen ruling, introduction to different halftone screens glass screen (brief study), contact screens – gray and magenta contact screen manufacture.

Unit: 2
Contrast control: Contrast with glass screen: contact screens. Auxiliary or supplementary exposures. Color reproduction: The visible spectrum additive synthesis and subtractive synthesis additive and subtractive combination for graphic for reproduction and practical interpretation.

Unit: 3
Mechanism of vision and theories of color-vision. color separation : direct & indirect.
(a) Fake color reproduction.
(b) Filters- Color separation filters and other filters: overlap in the filters. Wide band and narrow cut filters. Factors and filter ratios.

Unit: 4

Text Books:
Unit 1: Introduction to Environmental Science and Natural Resources

The multidisciplinary nature of Environmental Studies. Definition, scope and importance, need for public awareness.

Renewable and non-renewable resources: Land resources: Land as a resource, land degradation, soil erosion and desertification. Forest resources: Use and over-exploitation, deforestation, case studies. Water resources: Use and over-utilization of surface and ground water.

Unit 2: Ecosystems, Biodiversity and its Conservation


Unit 3: Environmental Pollution, Environment policies & laws

Definition, Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Nuclear hazards. Solid waste management. Pollution case studies.


Unit 4: Human Population and Environment and Fieldwork


Visit to a local area to document environmental assets—river/forest/grassland/hill/mountain. Visit to a local polluted site—Urban/Rural/Industrial/Agricultural. Study of common plants, insects, birds. Study of simple ecosystems—pond, river, hill slopes, etc.

Reference books


**Economics (BT PPT404)**

**Total Credit:** 3  
**Max. Marks:** 100  
**Theory:** 70  
**Internal:** 30  
**Time Allowed:** 3Hrs

**UNIT-I**


**UNIT-II**


**UNIT-III**


**UNIT-IV**

Meaning and significance of Economics, Role of economics in engineering and technology, Basic economic terms, Utility, Saving, Investment, Equilibrium, Micro and macro-economics, Economic policies, Globalization, Privatization, Liberalization, Demand &Supply Analysis, Meaning of demand and supply, Law of demand and supply, Elasticity of demand and its measurement, Production, Factors of production, Law of variable production, Production function, Cost Analysis, Types of costs and shapes of different cost curves, Theory of Firm and Pricing, Types of markets, Equilibrium of firm and industry under perfect, Monopoly and imperfect competition.

**Text Books:**

- Dessler, Human Resource Management, Pearson  
- Pandey I M, Financial Management, Vikas  
- Kotler Philip , Marketing Management , Pearson
Gravure Technology Lab (BT PPT405)

4. Pre-make and Make Ready in Gravure printing process.
5. Study of Feeding Unit of Gravure printing process.
7. Printing on Single color and multicolor on different Substrate.
8. Check the Practical problem in Gravure printing.

Graphic Imaging Technology Lab (BT PPT406)

1. Line negative preparation.
5. Fake color separation negative preparation.
8. Electronic scanning and manipulation.

GEC (To be taken from other Departments)
List of GEC (General Elective Course)
“For students of other Departments”
BT PPT407 (Brand Management)
BT PPT401 (Fundamentals of Gravure Technology) (GEC**)
BT PPT 405 (Gravure Technology Lab)
BT PPT 408 (Computers in Printing and Packaging) (GEC***)
UNIT – I
CONCEPT OF BRAND MANAGEMENT - Introduction to the concept of Brand Management as an active working principle within the sales and marketing department, within the overall organization, Case Studies.

UNIT – II
STRATEGIC PROCESS - The strategic process, environment and analysis, segmentation and positioning for building brands. Brand information systems and the application of brand Management using marketing principles, Case Studies

UNIT – III
BUYER BEHAVIOR - Consumer and Industrial Buyer Behavior, Models, Behavioral Applications in Branding, Case Studies, Application of analytical and logical marketing techniques required to solve Brand Management problems, and develop creative skills necessary to their success, Case studies Brand Affordability, Role of pricing in branding. Revenue – cost - profit relationships and their application to Brand Management. Revenue management and control, Case Studies

UNIT – IV
BRAND LAUNCHING - Brand Acceptance, Product innovation, development, management and control. Packaging and product design factors, product portfolio management , Brand Awareness promotional planning and control, rules of selling, advertising, PR and other specialist promotional tools, brand availability Physical distribution processes and channel decisions, Case Studies

REFERENCES
2. Kevin Lane Keller, „Strategic Brand Management“, Pearson Education Ltd., 2008
Computers in Printing and Packaging (BT PPT408)

Total Credit: 4
Max. Marks: 100
Theory: 70
Internal: 30
Time Allowed: 3 Hrs.

Unit: 1

Unit: 2

Unit: 3

Unit: 4
Digital Fonts : True type fonts, post script type-1, Bitmapped fonts, Adobe type manager, Transferring fonts, font manipulation software, Vector & Bitmap text and Graphic creation, Raster image processing. Digital O/P, creation of type for digital system, future trends and developments, font embedding, open type fonts.

Text Books:

2. Typesetting-Composition-Geoff, Barlow
3. Word Processor to Printed Page - Micheal Card
4. Digital Typography-Donald E.Knuth Introduction to Prepress - High Speirs
Computers in Printing and Packaging Lab (BT PPT409)

Total Credit: 1
Max. Marks: 50
External: 35
Internal: 15
Time Allowed: 3 Hrs.

1. Familiarizing with keyboard.
2. M.S. Word- Justification works, column work, single column, double column, fonts & type style changing, cut, copy & paste commands, wordart.
4. Introduction to Photo Shop & Corel Draw.
5. Comparing various outputs- Dot matrix, inkjet printers, laser printers, digital printers.
6. M.S. PowerPoint- Getting acquainted with presentation tools, MS Excel.
7. Multicolumn printing customized settings etc.
8. Preparation of posters, visiting cards etc.
Technology of Flexography (BT PPT501)

Unit: 1

Unit: 2

Unit: 3
Rewind equipment’s - surface winders, canter 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. Anilox roll - construction, cell structure, anilox roll wear, selecting the night anilox roll, chrome plating. Fountain rolls - formulating rubber for rolls, Flexo roller covering, Care of covered rolls.

Unit: 4

REFERENCES
Sheet Fed Offset Technology (BT PPT502)

Total Credit: 4
Max. Marks: 100
Theory: 70
Internal: 30
Time Allowed: 3 Hrs.

Unit: 1

Unit: 2
Feeding unit: Functions of the feeding section, sheet feeding types, feeding cycle, components of feeder, sheet conveying mechanisms, sheet detectors, sheet register, front lay and side lay, sheet insertion systems, grippers. Inking unit: role and function of inking system, different parts of inking system, split duct techniques, types of rollers in the inking system, setting of the rollers, care and maintenance of rollers, different inking systems, shore durometer.

Unit: 3
Dampening system: role and function of the dampening system, fountain solution, pH and conductivity of the fountain solutions, role of water in fountain solution, role of alcohol or alcohol substitutes in fountain solution, different rollers in the dampening system, roller coverings, doctor dwell, desensitizing the metal rollers, different dampening systems, care and maintenance of the dampening system. Printing unit; different cylinders and their construction, cylinder gears, cylinder gap, bearers, undercut, cylinder packing, patching, printing pressures, cylinder setting theories, cylinder balancing. Pre-make ready and make ready. Progressive print out.

Unit: 4

REFERENCES
Cellulose Technology (PPT-503)

Unit: 1


Unit: 2

Raw material preparation: pulping process; mechanical, chemical and semi-chemical process, screening, cleaning, and bleaching of the pulp. Stock preparation: dispersion/re-pulping, beating/refining, metering and blending, addition of non-fibrous materials. Paper and board making machines: overview of the papermaking machine. Different sections of a papermaking machine; wet end and head box, press and felt section, drying section, sizing section, and reeling section. Functions and working principles of different sections of the papermaking machine. Board making machine, its different sections, and working principles of these sections. Care and maintenance of paper and board making machine.

Unit: 3


Unit: 4

Different tests on paper: Physical properties tests and strength properties tests. Paper trouble shooting. Storage and handling of paper. Paper conditioning in the press room. Substrates other than the paper and paperboard: different substrates, their surface characteristics, and suitability to the particular printing system.

Text Book:

1. The 2018-2023 World Outlook for Packaging and Substrates by Icon Group International (Author)
Flexography Technology Lab (BT PPT504)

1. Introduction and familiarizing flexo machine and other related elements.
2. Preparation of rubber plates.
4. Registering and plate mounting on flexo plate cylinder.
5. Make ready procedures for a flexo machine.
6. Printing i. single color, ii. two color, iii. four color.
7. Studying of 6 color and 8 color flexo machines.

Sheet Fed Offset Lab (BT PPT505)

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.
7. Two color printing.
8. Four color printing.
Cellulose Technology Lab (BT PPT506)

1. Study of grain direction of the substrate.
2. Study of the machine direction of the substrate.
3. Study of GSM of the substrate.
4. Study of bursting strength of the substrate.
5. Study of testing strength of the substrate.
6. Study of Light fastness of the substrate.
7. Study of Water absorbance of the substrate.
8. Study of Ash content of the substrate.

List of DCEC (Discipline Centric Elective Courses)

BT PPT507  Wood, Glass and Metal Based Packaging
BT PPT508  Packaging Management
BT PPT 509  Paperboard and Corrugated Packaging
BT PPT510  Lean Six Sigma
BT PPT 503  Cellulose Technology (GEC****)
BT PPT 506  Cellulose Technology Lab
Wood, Glass and Metal Based Packaging (BT PPT507)

Total Credit: 4
Max. Marks: 100
Theory: 70
Internal: 30
Time Allowed: 3 Hrs.

Unit: 1

Wooden Based packaging: Introduction, Design factors, Qualities of timber, classification of timber, Moisture in timber, effect of moisture on the properties of wood, seasoning of wood, physical and mechanical properties of timber, Defects of timber, methods of preservation of timber. Wooden Container considerations: Form and size of each component, thickness of components, size and spacing of nails, number of planks in a shook, type of joints, style of container, reinforcements, workmanship.

Unit: 2

Consideration for box design: Type of loads, Grouping of Indian timbers, Plywood boxes-battened construction, timber species suitable for the manufacture of packing cases, wooden box styles. Crates: Introduction, Classification of crates, Selection of crate, Size and weight, Degree of protection, types of Bases, handling of crates, Packaging considerations.

Unit: 3


Unit: 4


REFERENCES
Packaging Management (BT PPT508)

Total Credit: 3.0  
Max. Marks: 100  
Theory: 70  
Internal: 30  
Time Allowed: 3 Hrs.

Unit: 1  

Unit: 2  
**Sales and Marketing of a Product** – Classifications of Sales, Marketing, Type of Marketing, Consumer buying behavior

Unit: 3  
**STRATEGIC MANAGEMENT AND PROJECT SELECTION** - Project selection models, Project portfolio process, Analysis under uncertainty, Project organization, Matrix organization

Unit: 4  

**TEXT BOOKS:**

**REFERENCES**
Paperboard & Corrugated Packaging (BT PPT509)

Total Credit: 4
Max. Marks: 100
Theory: 70
Internal: 30
Time Allowed: 3 Hrs.

Unit: 1

Unit: 2

Unit: 3

Unit: 4
Corrugated Board: Corrugated Board construction - Flutes/Single, Double, Triple Wall, Board grades, Manufacture, Adhesive Bond, Specifications, Flat Crush/Edge Crush Tests Box Certificates. Box Layout, Types, Manufacture/Scoring Allowances, Optimization, Economy. Compression Test, McKee Formula/ECT, Inserts/Partitions, Stack Height, Pallet Patterns, Banding/Strapping/Taping, Corrugated Board Pallets, Corrugated Board Cushions.

TEXT BOOKS

REFERENCES

Lean Six Sigma (BT PPT510)

Total Credit: 3.0
Max. Marks: 100
Theory: 70
Internal: 30
Time Allowed: 3 Hrs.

UNIT-I
EVOLUTION OF LEAN SIX SIGMA - Introduction to Lean Principles and Six Sigma Concepts-Similarities and differences – Synergy-Evolution of Lean Six Sigma

UNIT-II
LEAN SIX SIGMA APPROACH and IMPLEMENTATION - Lean Six Sigma Methodology- Phases of Lean Six Sigma Method, Managing Lean Six sigma Project ,Six sigma Methodologies ( DMAIC, DMADV , DFSS), Identifying Lean Six Sigma Projects, Define Scope, Planning for Implementation, Selection of tools and techniques for each phase, measuring the Benefits

UNIT-III

UNIT-IV

REFERENCES
5. Liker, Jeffrey; Meier, David ,Toyota Talent , Tata Mcgraw Hills
Color Perception & Calibration (BT PPT601)

Total Credit: 4
Max. Marks: 100
Theory: 70
Internal: 30
Time Allowed: 3 Hrs.

Unit: 1
Introduction of color theories and its application. Detail study of color reproduction from original to color printing. Color management – Introduction, WYSIWYG, functions of color management, color management module, principle of color management, models of color management, RGB, HSB & ICC.

Unit: 2

Unit: 3
Colorimeter and spectrophotometer, color calibration, densitometry, type of densities, specular, diffuse, double difference density. Color printing, factors in color printing, printed color density, trapping, tone value, UCR, GCR, color control strips and punch register system, dot area measurement.

Unit: 4
Basic elements of scanners, principles of electronic scanning, pixels – binary resolution, AM, FM screening, basic scanner types-pantone, focal tone, true match, special/spot color, scanner resolution, white & black point adjustment. Color correction, need for color correction, masking and types of masking, function of masking, brief introduction to retouching, retouching chemicals, intensification, grey balance.

Text Books:
8. Gary G. Field :- Tone & Color correction (GATF).
References:
Image Carrier for Printing Processes (BT PPT602)

Unit: 1

Unit: 2

Unit: 3

Unit: 4

Text Books:

1. Handbook of Print Media Technologies and Production Methods Editors: Kipphan, Helmut (Ed.)
Packaging Machineries (BT PPT603)

Total Credit: 3
Max. Marks: 100
Theory: 70
Internal: 30
Time Allowed: 3 Hrs.

Unit: 1

Unit: 2

Unit: 3

Unit: 4

Text Books:

1. Packaging Machinery Handbook: The complete guide to automated packaging machinery including packaging line designNov 17, 2012 by Henry CPP, John R
Packaging & Printing Inks (BT PPT604)

Unit: 1

Unit: 2

Unit: 3
Radiation curing: Introduction, radiation curing inks, ink cure considerations, chemistry of UV curing-photo initiation, propagation, termination. Cationic curing, electron beam curing. Security Inks: Range of security inks special security features- fluorescence, phosphorescence, reflected by improved filters, magnetism, security printing inks for cheques-penetrating L/p inks, water fugitive, inks, inks reacting with pen evadicators, red-ox reagents, inks reacting with solvent, invisible reactive inks, carbonizing inks.

Unit: 4
Security ink conformity tests and Q.C. test-tests for chemical resistance, light fastness, rub resistance test, crumpling resistance test, color control, control of the rheological properties, control of drying time, control of various specific properties. Environmental consideration in security printing. Study light fastness of inks, factors affecting light fastness of ink, new improvements in light fastness properties of inks.

Text Books:
1. 'MANUFACTURE AND TESTING OF PRINTING INKS, ROLLERS AND BLANKETS. INK TECHNOLOGY FOR PRINTERS AND STUDENTS, PART 1' Hardcover – January 1, 1963 by E.A. APPS (Author)
3. The Printing Ink Manual, Editors: Leach, Robert, Pierce, Ray (Eds)
Image Carrier for Printing Processes Lab (BT PPT605)

Total Credit: 1  
Max. Marks: 50  
External: 35  
Internal: 15  
Time Allowed: 3 Hrs.

1. Introduction and Practice of Drawing of layout and preparation of pasting for exposing.  
2. Study of Tools, materials and equipments used in Offset Image generation Lab.  
3. Study of Tools, materials and equipments used in Flexographic Image Generation Lab.  
4. Study of tools, materials and equipments used in Gravure Image Generation Lab.  
5. Preparation of various Types of Offset Plates.  
6. Preparation of various Types of Flexo-graphic Plates.  
7. Preparation of various Types of Gravure Image Cylinder  
8. Quality Control equipment’s and their use in Image carrier department for various processes.

Package Testing Lab. (BT PPT606)

Total Credit: 1  
Max. Marks: 50  
External: 35  
Internal: 15  
Time Allowed: 3 Hrs.

1. Determination of Burst strength of various packaging materials.  
2. Determination of Crush strength of various packaging materials.  
4. Determination of Stiffness of various packaging materials.  
5. Determination of Scuff resistance of various packaging materials.  
7. Determination of gloss & haze of various packaging materials.  
8. Measure the color of a packaging material and compute color differences between different batches.
Color Perception and Calibration Lab (PPT-607)

Total Credit: 1
Max. Marks: 50
External: 35
Internal: 15
Time Allowed: 3 Hrs.

1. Electronic color separation.
2. Study of flat-bed scanner.
3. Study of color drum.
4. Study of manual color separation technology.
5. Study of UCR.
6. Study of GCR.
7. Study of Masking.
8. Study of color density instruments.

List of DCEC (Discipline Centric Elective Courses)

BT PPT608   Packaging Attributes – Shelf Life
BT PPT609   Plastic & Polymer Based Packaging
BT PPT610   Sustainability and Environment Printing and Packaging
UNIT - I
SHELF LIFE AND KINETICS OF PRODUCT DETERIORATION - Introduction, factors influencing shelf life, types of deterioration – physical, chemical, microbiological; measuring shelf life, predicting shelf life – predictive models, software systems; sensory evaluation methods, accelerated shelf-life tests – initial rate approach, kinetic model approach, Design of shelf life experiments, Extending shelf life

UNIT – II
BASIC PRINCIPLES OF MASS TRANSFER - Basic concepts of mass transfer, Mechanism of permeation, Sorption, diffusion, Permeability, Factors affecting permeability, Migration Interactions - volumetric method, gravimetric method, differential method, determination of solubility; Gas chromatograph

UNIT - III

UNIT – IV
PERMEABILITY- Introduction, importance of permeation – effect of time and temperature, effect of moisture, effect of oxygen, choice of materials; Rate of transmission – variables of the polymer, effect of permeating species, temperature and pressure, wall thickness; Measurement of permeability- WVTR, GTR; multilayer structures, application of permeability to material selection and shelf-life estimation, Cycling conditions, Computer models, calculations, predictions ,Product fragrance and packaging material interactions, Migration of packaging material with product/solvents, Effect of irradiation of polymeric packaging materials in formation of volatile compounds, Flavour/Active ingredient absorption with packaging material, Shelf Life Prediction, Mold

REFERENCES
Plastics and Polymer Based Packaging (BT PPT609)

Total Credit: 4
Max. Marks: 100
Theory: 70
Internal: 30
Time Allowed: 3 Hrs.

Unit: 1


Unit: 2


Unit: 3


Unit: 4


Text Books:

Unit: 1

Introduction: Environment, ecology and sustainable development concept. Printing and Packaging environmental aspects; environmental impacts of printing and packaging operations.

Unit: 2

Packaging wastes, effluent treatment and waste minimization. To study reuse, reduce, recycle concept related with printing and packaging.

Unit: 3

To study degradable and non degradable printing and packaging materials. Environmental impact including risk assessment, environmental legislation, Packaging effluent and its treatment.

Unit: 4

Deming Cycle, Problem Solving, Auditing i.e. Quality safety, environmental integration quality assurance practices into a production stream or packaging line. Supply/ storage/ vaporization, Awareness on-site generation, pressure swing/ membrane/ cryogenic methods, Health and Safety. Energy conservation mechanisms with printing and packaging.

REFERENCES
2. Logistics, David J.Bloomberg, Stephen Lemay and Joe B.Hanna, PHI 2002
4. Modeling the supply chain, Jeremy F.Shapiro, Thomson Duxbury, 2002
Unit: 1

Introduction: Definition of Quality, Quality control, its meaning and purpose setting up a Quality Control Programme, and establishing necessary System and procedures, economic consideration. Management Consideration: Quality Control as an attitude and management tool, management’s responsibility, organization and personnel functions, getting everybody involved. Total Quality Control. Quality Control procedures and methods. Different shapes of quality control.

Unit: 2

Materials Control: Establishing clear specifications and standardization of materials to be purchased - particularly Packaging substrates, Inspection and testing of incoming materials as part of quality control; importance of proper handling and maintaining records of performance of materials Sampling and sampling plans. Establishing Quality control programme in different departments of Packaging Plant.

Unit: 3

Quality Control Instrumentation: Paper and paper board testing instruments for testing printability, print quality and end-use requirements, Ink testing instruments for testing optical and working properties and end-use requirements Process control instruments, devices and aids used in the galley and dark-room, stripping department, plate room and press room for specific processes and for general purposes 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. Introduction to ISO:9000 and ISO:14000 series. Supply chain management (SCM) – concept of logistics and SCM – decision phases – design, planning and operation – decision areas – type of supply chain views - flows in supply chain – supply chain and competitive performance – performance measures for SCM – strategic fit – drivers of supply chain, NABL, Role of NABL in tracing and tracking of Lab test and Report.

Unit: 4


Text Books:
Finishing and Decorating Technology (BT PPT702)

Total Credit: 3
Max. Marks: 100
Theory: 70
Internal: 30
Time Allowed: 3 Hrs.

Unit: 1

Unit: 2

Unit: 3

Unit: 4

Text Book:
2. Binding And Finishing - Ralph Lyman Binding And Finishing Part-1 - B.D.Mendiratta

### Quality Control Lab (BT PPT703)

| Total Credit: 1  |
| Max. Marks: 50  |
| External: 35    |
| Internal: 15    |
| Time Allowed: 3 Hrs. |

1. Tensile strength, burst strength, Substance, caliper, porosity test, cobb sizing value test.
2. Tearing, brightness, gloss test, G.S.M.testing, Weight, folding endurance and other related tests.
4. Hot air oven tester, absorbing test.
5. Pick strength, humidity control test, room temp testing.
7. Investigation of pigment properties.
8. Investigation of solvent properties.
9. Identification of Polymeric material.
10. Scuff proof-ness test.

### Finishing and Decorating Lab (BT PPT704)

| Total Credit: 1  |
| Max. Marks: 50  |
| External: 35    |
| Internal: 15    |
| Time Allowed: 3 Hrs. |

1. Preparation of writing board.
2. Preparation of Photo Album.
3. Preparation of following type of Mechanical binding - Spiral wire binding, Wire ‘O’ binding, Ring binding.
4. Preparation of files of following designs - Loose leaf file - single piece, loose leaf file - Two piece tab binder, loose leaf guard file - Boards joined with spine strip, Court case file, Portfolio - Closed file to keep confidential loose sheets.
5. Preparation of telephone directory with Indexes and Tabs.
6. Study of various controls, operations and mechanisms of the following machines: Folding machine, Guillotine machine, Cutter and Creaser, Varnishing machine, Laminating machine,
Miscellaneous machines.

7. Print finishing operation to be conducted, Gold blocking, Embossing, Edge decoration,

8. Thermography, Marbling, Velvet printing, Rubber printing, Die printing, Pouch lamination.
Industrial Training (BT PPT705)

Total Credit: 3
Max. Marks: 100
External: 70
Internal: 30

REPORT OF INDUSTRIAL TRAINING WILL BE EVALUATED BY A COMMITTEE DULY CONSTITUTED BY THE CHAIRMAN.

List of DCEC ( Discipline Centric Elective Courses)

BT PPT706  Food & Agro Based Packaging
BT PPT707  Digital & Advance Printing Processes
BT PPT708  Packaging of Healthcare and Pharmaceutical
BT PPT709  Costing and Estimating
Food and Agro Based Packaging (BT PPT706)

Unit: 1


Unit: 2


Unit: 3


Unit: 4


REFERENCES
Digital & Advance Printing Processes (BT PPT707)

Unit: 1

Unit: 2

Unit: 3

Unit: 4

Text Books:

1) Operator manual –GATF
2) Color scanning and imaging systems-Gary field, GATF
3) Production Planning and inventory control-Seetharama L.Narasimhan,Dennis W.Mcleavey, Peter J.Villington
4) Production Planning ,Control and management-K.C.Jain, L.N. Aggarwal
Packaging of Healthcare and Pharmaceuticals (BT PPT708)

Unit: 1

Unit: 2

Unit: 3

Unit: 4
Growth and development of cosmetic packaging industry in India. Modern trends in drugs & cosmetic packaging.

REFERENCES
Costing & Estimating (BT PPT709)

Total Credit: 4
Max. Marks: 100
Theory: 70
Internal: 30
Time Allowed: 3 Hrs.

Unit: 1

Concept of cost, Analysis of cost, fixed cost, variable cost, Elements of cost and its method of recovery. Function and Purpose of costing and estimating from printer’s point of view & customer’s point of view. Difference between costing and estimating. Qualification of an estimator, estimators tools. Introduction to finance & DBMS.

Unit: 2

Job costing, its need and procedures, Cost sheet, Daily Docket, WIT and its importance in costing. Type of costing system for printing industry & related problem.

Unit: 3


Unit: 4


Text Books:

1. Principles of Accounting - B. S. Raman
3. Cost Accounting - B. R. Bhar
4. Print Management - Derek Porter
5. Printer’s Costing & Estimating - B. D. Mendiratta
9. Print Production Management - Gray G. Field
Project (BT PPT801)

Total Credit: 10
Max. Marks: 100
External: 70
Internal: 30

Project will be an innovative working model of machine/equipment’s used in Printing & Packaging Industry with required modifications and will be demonstrated during examination with the help of project report by a group of maximum ten students under the guidance of project guide (Regular faculty member of the department).