DEPARTMENT OF PRINTING AND PACKAGING TECHNOLOGY

Course Outcomes
SE : III SEM (REV- 2019 'C' Scheme)

Subject- Applied Mathematics-III,   **Course Code-** PPC 301

CO1	Apply the concept of Laplace transform to solve the real integrals in engineering problems.
CO2	Apply the concept of inverse Laplace transform of various functions in engineering problems.
CO3	Expand the periodic function by using Fourier series for real life problems and complex engineering problems.
CO4	Find orthogonal trajectories and analytic function by using basic concepts of complex variable theory.
CO5	Apply Matrix algebra to solve the engineering problems.
CO6	Solve Partial differential equations by applying numerical solution and analytical methods for one dimensional heat and wave equations

Subject- Packaging Introduction & Concepts,   **Course Code-** PPC 302

CO1	Effectively observe and compare the different package forms.
CO2	Describe the importance of compatibility studies and their associated parameters.
CO3	Analyze the various hazards and environmental issues related to Packaging.
CO4	Analyze the aesthetics of a package and the differentiating factors.
CO5	Elaborate the importance of quality in packaging.
CO6	Explain significance of packaging in terms of today's market.

Subject- Introduction to Printing Technology,   **Course Code-** PPC 303

CO1	Distinguish various printing principles like planography, intaglio & relief.
CO2	Compare the process of image generation on the basis of typography, reprography & layout making.
CO3	Analyze the various Press configurations of Offset, Gravure, Flexography & Letterpress.
CO4	Classify Inks and Substrates used in various Printing technologies.
CO5	Recognize various materials used in printing operations and distinguish Print finishing operations.
CO6	Choose an appropriate Printing process for any given Printing job

Subject- Paperbased Packaging Materials,   **Course Code-** PPC304

CO1	Explain the raw materials involved in pulping and paper making process.
CO2	Explain the operations involved in pulping and paper making process
CO3	Identify the manufacturing process for different types of paper based Packages.
CO4	Design and estimate material requirements for major forms of paper based packaging.
CO5	Test and analyze the major properties of paper based packaging materials.

Subject- Glass, Metal & Textile based Packaging Materials,   **Course Code-** PPC 305

CO1	Describe & interpret the various manufacturing process for glass bottles, metal cans & tubes and textile based bags .
CO2	Explain various design aspects for various types of package forms made up of glass.
CO3	Explain various design aspects for various types of package forms made up of metal.
CO4	Summarize the aerosol technology and its wide application in packaging.
CO5	Discuss various quality control and testing procedures for these package forms.
CO6	Describe the basics of fabric & textile technology to produce bags of various materials like jute, hemp etc.

Subject- Principles of Graphic Arts & Design-I,   **Course Code-** PPL 301

CO1	Create a design based on specific requirement.
CO2	Analyze the usage of particular colour & text in Package design.
CO3	Generate various design layouts with proper visual impacts.
CO4	Create a design for folding carton with appropriate software.
CO5	Edit an image and use it in a Package design.
CO6	Generate Logos for a given concept or product

Subject- Screen Printing Laboratory,   **Course Code-** PPL 302

CO1	Prepare screen printing image carrier by direct, indirect photographic methods.
CO2	Calibrate the new exposure with respect to change in various process variables.
CO3	Demonstrate the use of different photographic films for mesh preparation according to image.
CO4	Produce different printed samples for various substrates like fabric, glass, acrylic, wood by electing suitable inks & coatings for that material.
CO5	Produce & analyze a halftone dot image generated for multi color printing and registration of color.
CO6	Analyze the common faults in Screen Printing Process.

Subject- Skill Based Lab: Packaging Material Testing - I,   **Course Code-** PPSBL 301

CO1	Check grammage and thickness of paper, paper board and plastic films.
CO2	Find out water absorption capacity of paper / board.
CO3	Perform strength tests related to Stiffness, Burst, Puncture and Tear.
CO4	Evaluate the strength characteristics of paper and plastic films.
CO5	Analyse the plies in a CFB and identify its flute type.
CO6	Evaluate the strength of a CFB.

Subject- Mini Project 1A,   **Course Code-** PPPBL 301

CO1	Identify problems based on societal /research needs.
CO2	Apply Knowledge and skill to solve societal problems in a group.
CO3	Develop interpersonal skills to work as member of a group or leader.
CO4	Draw the proper inferences from available results through theoretical/ experimental/simulations.
CO5	Analyse the impact of solutions in societal and environmental context for sustainable development.
CO6	Use standard norms of engineering practices
CO7	Excel in written and oral communication.
CO8	Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.
CO9	Demonstrate project management principles during project work.

Subject- Engineering Mathematics-IV,   **Course Code-** PPC 401

CO1	Apply the concept of Vector calculus to evaluate line integrals, surface integrals using Green's theorem, Stoke's theorem & Gauss Divergence theorem.
CO2	Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals.
CO3	Apply the concept of Correlation, Regression and curve fitting to the engineering problems in data science.
CO4	Illustrate understanding of the concepts of probability and expectation for getting the spread of
CO5	the data and distribution of probabilities.
CO6	Apply the concept of probability distribution to engineering problems & testing hypothesis of small samples using sampling theory.

Subject- Plastics in Packaging,   **Course Code-** PPC 402

CO1	Describe the various polymerization mechanisms and techniques.
CO2	Differentiate between thermoplastics and thermosets.
CO3	Effectively communicate the relation between effects of temperature and crystallinity of polymers.
CO4	Identify and categorize various plastics by chemical and instrumentation methods.
CO5	Choose a plastic material for a specific application based on their physical and chemical properties.
CO6	Describe the properties that are important from the point of view of plastic processing.

Subject- Colour Reproduction,   **Course Code-** PPC 403

CO1	Summarize the Colour Vision theory and its concept.
CO2	Discuss and summarize the conventional and digital method of colour separation.
CO3	Examine images and modify them with colour correction.
CO4	Measure the densitometric terms and analyze graphically.
CO5	Summarize the spectrophotometric terms and perform relative measurements of various printed samples.
CO6	Recognize the input and output devices being used.

Subject- Offset Printing,   **Course Code-** PPC 404

CO1	Describe the various terminologies in offset printing process.
CO2	Operate offset machines and evaluate single colour sheet feed press.
CO3	Identify and rectify suitable solutions for errors associated with platemaking and pressroom.
CO4	Analyze troubles related with quality and can produce possible remedies to minimize print problems.
CO5	Identify the conversion technology of offset printed jobs
CO6	Plan and Layout the imposition of commercial jobs.

Subject- Digital Electronics and Microcontrollers   **Course Code-** PPC 405

CO1	Describe any logical expression using logic gates.
CO2	Examine the structure of various number systems and its application in digital design
CO3	Apply reduction techniques to the logical expressions.
CO4	Discuss the combinational and sequential circuits like encoder, decode, flip-flop, registers and counters.
CO5	Identify features of various Microcontroller.
CO6	Write and execute assembly language programs.
CO7	Summarize the need and functioning of microcontroller in various machines of Printing and Packaging.

Subject- Principles of Graphic Arts and Design-II   **Course Code-** PPL 401

CO1	Create a Package design based on specific requirement.
CO2	Create Ups using the editing software for given substrate dimension.
CO3	Generate various design layouts with proper visual impacts.
CO4	Create a design for folding carton with appropriate software.
CO5	Edit an image and use it in a Package design
CO6	Get acquaintance to structural designing software and its tools

Subject- Colour Reproduction Laboratory   **Course Code-** PPL 402

CO1	Match any two given colours under prescribed light source
CO2	Measure density and compare with the standards.
CO3	Analyse the colour difference between any two given printed samples
CO4	Measure various vitals of Print quality such as Dot gain, Print contrast, Hue error and Grayness and Trapping
CO5	Comment on Print quality based on measured values
CO6	Suggest Corrections required to achieve better print quality

Subject- Offset Printing   **Course Code-** PPL 403

CO1	Analyse the problem of printed sample and troubleshoot it
CO2	Perform printing on single color offset printing machine
CO3	Evaluate the number of sheets required for printing a particular job.
CO4	Evaluate the inking and dampening system condition through testing.
CO5	Plan and provide a dummy pack for a particular product.
CO6	Evaluate the conversion technologies used for a commercial pack.

Subject- Digital Electronics and Microcontrollers Laboratory   **Course Code-** PPL 404

CO1	To demonstrate the knowledge of operation of logic gates.
CO2	To apply Boolean theorems, De Morgan's theorems and Karnaugh maps reduction method to simplify logic problems.
CO3	Create the appropriate truth table from a description of a combinational logic functions.
CO4	Demonstrate the knowledge of operation of basic types of flip-flops.
CO5	To analyze and design digital combinational circuits including arithmetic circuits (half adder, full adder, half subtractor and full subtractor).
CO6	Develop skill in simple program writing for 8051

Subject- Skill Based Lab: Packaging Material Testing – II   **Course Code-** PPSBL 401

CO1	Identify plastic material by chemical and instrumentation method.
CO2	Determine the strength of an adhesive used.
CO3	Find closure dimensions and its opening and closing torque.
CO4	Find the GSM of all layers in a label.
CO5	Perform taping and strapping of a box.
CO6	Analyze thermogram from a DSC.

Subject- Mini Project 1B   **Course Code-** PPPBL 401

CO1	Identify problems based on societal /research needs.
CO2	Apply Knowledge and skill to solve societal problems in a group.
CO3	Develop interpersonal skills to work as member of a group or leader.
CO4	Draw the proper inferences from available results through theoretical/ experimental/simulations.
CO5	Analyse the impact of solutions in societal and environmental context for sustainable development.
CO6	Use standard norms of engineering practices
CO7	Excel in written and oral communication.
CO8	Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.
CO9	Demonstrate project management principles during project work

TE: SEM V (REV- 2019 'C' Scheme)

Course Code:	PPC501
Course:	Plastic Processing and Conversion Technologies
CO-1	Describe the fundamental concepts in plastic processing and conversion technology.
CO-2	Analyse the various plastic materials and its application
CO-3	Understand and use suitable conversion technique as per the end product
CO-4	Produce plastic products by using various conversion techniques
CO-5	Perform different testing methods for plastic product
CO-6	Study different processing parameters required in industry

Course Code:	PPC502
Course:	Theory of Machines and Design
CO-1	Analyse the stresses and strains in mechanical components, and understand, identify and quantify failure modes for mechanical parts.
CO-2	Describe the basic machine elements used in machine design.
CO-3	Design machine elements to withstand the loads and deformations for a given application, while considering additional specifications.
CO-4	Develop the approach to design the component under realistic conditions.
CO-5	Design Machine element against static loading
CO-6	Develop the ability to design the component under realistic conditions

Course Code:	PPC503
Course:	Instrumentation and Process Control
CO-1	Have a knowledge of measuring devices and signal conditioning; helping to select the correct transducer as per the requirement.
CO-2	Confidently design a PID controller using opamps or through MATLAB program.
CO-3	The understanding of applications of PLC's in latest printing machines and also packaging machines will be developed.
CO-4	Understand applications of PLC's in industries and printing and packaging machines.
CO-5	Explain PLC and SCADA systems and their use in process control.
CO-6	Understand and formulate various applications like DAS and data logger

Course Code:	PPC504
Course:	Ancillary Packaging Materials & Industrial Packaging
CO-1	Effectively choose packaging materials based on characteristics of industrial products.
CO-2	Describe the various properties & defects of wood packaging material
CO-3	Analyse the various hazards & environmental issues related to Packaging and select a specific protection method for the product.
CO-4	Choose various bulk carriers for industrial packaging based on the type of product.
CO-5	Analyse various types of internal fitments for product protection and retainment.
CO-6	Explain the characteristics and applications of various wooden package forms

Course Code:	PPDO5011
Course:	Packaging Distribution Dynamics (Department Level Optional Course – 1)
CO-1	Analyse the hazards encountered in distribution and determine protection requirement
CO-2	On the basis of principles of distribution dynamics estimate the vibration, shock encountered by a product in distribution
CO-3	Calculate cushioning requirement for a product in distribution.
CO-4	Perform tests to gauge package performance in distribution.
CO-5	Analyse ways to reduce the effect of vibration, shock and handling of product during distribution.
CO-6	Explain the method for developing the cushion curve and damage boundary curve

Course Code:	PPDO5012
Course:	Inks and Coatings (Department Level Optional Course – I)
CO-1	Explain the formulation for different types of inks
CO-2	Explain the ink components for different printing processes and materials
CO-3	Test and analyse the properties of inks and coatings.
CO-4	Suggest ink for a given process
CO-5	Toubleshoot problems related to ink synthesis
CO-6	Suggest suitable varnish for a given application.

Course Code:	PPDO5013
Course:	**Print Finishing and Converting (Department Level Optional Course – I)**
CO-1	Analyse the print finished product.
CO-2	Examine the Product for the entire process involved in manufacturing and finishing.
CO-3	Discuss the print finishing requirements for verity of different segment jobs.
CO-4	Analyse the layout and imposition of the job
CO-5	Identify and rectify post finishing process problems
CO-6	Discuss the various post finishing terminology

Course Code:	PPDO5014
Course:	**Additive Manufacturing (3D Printing) (Department Level Optional Course – I)**
CO-1	Develop a CAD models for 3D printing.
CO-2	Import and Export CAD data and generate .stl file.
CO-3	Select a specific material for the given application.
CO-4	Understand the fundamentals of Additive Manufacturing Technologies for engineering applications.
CO-5	Understand the methodology to manufacture the products using additive and subtractive theory.
CO-6	Produce a product using 3D Printing or Additive Manufacturing (AM) with comparative analysis of various designs.

Course Code:	PPL501
Course:	**Plastic Processing and Conversion Technologies Laboratory**
CO-1	Describe the fundamental concepts in plastic processing and conversion technology.
CO-2	Analyse the various plastic materials and its application.
CO-3	Understand and use suitable conversion technique as per the end product.
CO-4	Produce plastic products by using various conversion techniques.
CO-5	Perform different testing methods for plastic product.
CO-6	Study different processing parameters required in industry.

Course Code:	PPL502
Course:	**Theory of Machines and Design Laboratory**
CO-1	Analyse the stresses and strains in mechanical components, and understand, identify and quantify failure modes for mechanical parts.
CO-2	Describe the basic machine elements used in machine design.
CO-3	Design machine elements to withstand the loads and deformations for a given application, while considering additional specifications.
CO-4	Develop the approach to design the component under realistic conditions.
CO-5	Design Machine element against static loading
CO-6	Develop the ability to design the component under realistic conditions

Course Code:	PPL503
Course:	**Instrumentation and Process Control Laboratory**
CO-1	Knowledge of measuring devices and signal conditioning will help students to select the correct transducer as per the requirement.
CO-2	Students will be able to confidently design a PID controller using opamps or through MATLAB program.
CO-3	The understanding of applications of PLC's in latest printing machines and also packaging machines will be developed.
CO-4	Understand applications of PLC's in industries and printing and packaging machines.
CO-5	Explain PLC and SCADA systems and their use in process control.
CO-6	To Understand and formulate various applications like DAS and data logger

Course Code:	PPL504
Course:	**Professional Communication and Ethics –II**
CO-1	Plan and prepare effective business/ technical documents which will in turn provide solid foundation for their future managerial roles.
CO-2	Strategize their personal and professional skills to build a professional image and meet the demands of the industry.
CO-3	Emerge successful in group discussions, meetings and result-oriented agreeable solutions in group communication situations.
CO-4	Deliver persuasive and professional presentations.
CO-5	Develop creative thinking and interpersonal skills required for effective professional communication.
CO-6	Apply codes of ethical conduct, personal integrity and norms of organizational behaviour.

Course Code:	PPSBL501
Course:	**Skill Based Lab: Package Design and Graphics – I**
CO-1	Define basic design terminology.
CO-2	Visualize and prepare detail drawing of a given object.
CO-3	Create a design based on specific requirement.
CO-4	Design Plastic/Glass/Metal Containers.
CO-5	Analyse various package designs.
CO-6	Design & draw detail and assembly of different packages.

Course Code:	PPPBL501
Course:	**Mini Project 2A**
CO-1	Identify problems based on societal /research needs.
CO-2	Apply Knowledge and skill to solve societal problems in a group.
CO-3	Develop interpersonal skills to work as member of a group or leader.
CO-4	Draw the proper inferences from available results through theoretical/ experimental/simulations.
CO-5	Analyse the impact of solutions in societal and environmental context for sustainable development.
CO-6	Use standard norms of engineering practices
CO-7	Excel in written and oral communication.
CO-8	Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.
CO-9	Demonstrate project management principles during project work

TE: SEM VI (REV- 2019 'C' Scheme)

Course Code:	PPC601
Course:	**Packaging Machineries and Systems**
CO-1	Suggest the packaging material use and its conversion as per the product geometry.
CO-2	Suggest the filling machine required for the line operations.
CO-3	Choose the ancillary machineries required in the line operations based on the product to be packed.
CO-4	Analyse the different conveying system used for various line operations.
CO-5	Select different online and offline testing methods that are required during the converting operations or on the packaging lines.
CO-6	Suggest Methods and Machine used for case packing

Course Code:	PPC602
Course:	**Food and Pharmaceutical Packaging**
CO-1	Analyse and choose a barrier material for a specific food product based on barrier properties studied.
CO-2	Analyse and choose a preservation method for a specific food product-based product sensitivity and shelf life required.
CO-3	Describe the various characteristics of pharmaceutical drugs and their sensitivities.
CO-4	Select the right type of package form for a pharma product, based on the product nature, form & size.
CO-5	Determine the shelf life of given food and develop the technique to improve the same.
CO-6	Develop a pharmaceutical package to increase the stability of the medicine during its storage

Course Code:	PPC603
Course:	**Gravure Printing**
CO-1	Describe the various components of gravure printing machine and its functions.
CO-2	Explain various design aspects gravure cylinder and the process of engraving it.
CO-3	Summarize the various operations performed while printing on Gravure machine
CO-4	Discuss various inks and substrates used for gravure process with quality control measures
CO-5	Describe various web handling and registration control for gravure printing
CO-6	Calculate the different anatomy of gravure cylinder

Course Code:	PPC604
Course:	Colour Management
CO-1	Summarize importance of Colour management.
CO-2	Select test charts for various devices to create profile based on the need.
CO-3	Apply various rendering intents on images using image editing software.
CO-4	Measure the quality of profile generated by software.
CO-5	Summarize various colour management workflows.
CO-6	Understand the current trends in Colour management industry.

Course Code:	PPDO6011
Course:	Packaging Laws, Regulations & Sustainability (Department Level optional Course – 2)
CO-1	Summarize the rules and regulations with respect to packaging in India and their impact in the domestic market.
CO-2	Identify and compare the international laws with relation to packaging
CO-3	Describe the need & scope of sustainability in a process, product/package or equipment.
CO-4	Describe & analyze the metrics & LCA for packaging sustainability.
CO-5	State and explains the various waste management systems.
CO-6	Describe the need of biopolymers & biobased polymers in sustainable economy

Course Code:	PPDO6012
Course:	Digital and Security Printing (Department Level optional Course – 2)
CO-1	Analyse & describe the Digital image anatomy for Pre-press environment.
CO-2	Analyse & describe the concepts in digital printing with its Merits & De-merits.
CO-3	Summarise the process involved in Digital work-flow & data handling.
CO-4	Elaborate the importance of security printing with respect to use in everyday life.
CO-5	Describe first line inspection of different documents & Creation of various security devices.
CO-6	Discuss the significance of Brand protections and tools available.

Course Code:	PPDO6013
Course:	Financial & Marketing Management (Department Level optional Course – 2)
CO-1	Explain the Indian finance system and their components,
CO-2	Describe the sources of finance and estimate the Present & Future Value.
CO-3	Estimate the financial ratios & perform investment appraisals.
CO-4	Explain the marketing concept and marketing environment.
CO-5	Describe the concepts of Marketing Mix, Product & pricing decisions
CO-6	Elaborate on Distribution & Promotion decisions and describe the various marketing strategies

Course Code:	PPDO7014
Course:	Project Management and Entrepreneurship (Department Level optional Course – 2)
CO-1	Describe the fundamental concepts in Project management
CO-2	Analyze the various scheduling and planning techniques
CO-3	Understand and apply suitable strategy for any specific project
CO-4	Apply project management principles in business situations to optimize resource utilization and time.
CO-5	Analyze Life Cycle of a given project.
CO-6	Demonstrate skills needed to run a successful business.

Course Code:	PPL 601
Course:	Food Packaging Laboratory
CO-1	Analyze the Food product and its dependency on Moisture content
CO-2	Use the sensory analysis technique to characterize the product
CO-3	Estimate the permeability of the packaging materials
CO-4	Evaluate the shelf life of packaged food product
CO-5	Apply the latest packaging technologies to various food product
CO-6	Design the suitable package for the food product

Course Code:	PPL602
Course:	Colour Management Laboratory
CO-1	Summarize importance of Colour management.
CO-2	Select test charts for various devices to create profile based on the need.
CO-3	Apply various rendering intents on images using image editing software.
CO-4	Measure the quality of profile generated by software.
CO-5	Summarize various colour management workflows.
CO-6	Understand the current trends in Colour management industry

Course Code:	PPT601
Course:	Industrial Visits
CO-1	Analyse the print, packaged, converted & finished product.
CO-2	Examine the Product for the entire process involved in manufacturing, converting and finishing.
CO-3	Understand operational workflows for various Industries.
CO-4	Analyse Plant Layout, Inventory & Logistics provisions.
CO-5	Understand the Organisational structure and Manpower requirements.
CO-6	Discuss the Safety-Health-Environmental practices, Laws, Regulations & Certifications found in the Industry

Course Code:	PPSBL601
Course:	Skill Based Lab: Package Design & Graphics-II
CO-1	Understand the need and importance of CAD file in Packaging Design
CO-2	Impact CAD of and Layout on costing and production
CO-3	Using 3D as a QA tool to evaluate packaging design
CO-4	Make a print ready graphic file (trapping, white/ varnish layers/barcodes / preflighting etc.,)
CO-5	Undestand the concepts of Digital sample making.
CO-6	Understand various print and finishing processes and their effects on graphics

Course Code:	PPPBL601
Course:	Mini Project 2 B
CO-1	Identify problems based on societal /research needs.
CO-2	Apply Knowledge and skill to solve societal problems in a group.
CO-3	Develop interpersonal skills to work as member of a group or leader.
CO-4	Draw the proper inferences from available results through theoretical/ experimental/simulations.
CO-5	Analyse the impact of solutions in societal and environmental context for sustainable development.
CO-6	Use standard norms of engineering practices
CO-7	Excel in written and oral communication.
CO-8	Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.
CO-9	Demonstrate project management principles during project work.

BE : VII SEM (REV- 2016 'CBCGS' Scheme)

Subject- Laws, Regulations & Sustainability in Packaging   **Course Code-** PPC701

CO1	Summarize the rules and regulations with respect to packaging in India and their impact in the domestic market.
CO2	Identify and compare the international laws with relation to packaging
CO3	Describe the need & scope of sustainability in a process, product/package or equipment.
CO4	Describe & analyze the metrics & LCA for packaging sustainability.
CO5	State and explains the various waste management systems.
CO6	Describe the need of biopolymers & biobased polymers in sustainable economy.

Subject- Packaging Distribution & Logistics   **Course Code-** PPC702

CO1	Apply the supply chain management approach in various processes of a package development.
CO2	Describe the role of retailing in packaging industry.
CO3	Evaluate the usage & application of Unit Load Devices.
CO4	To explain and perform transport worthiness tests for a given package.

Subject- Financial & Marketing Management   **Course Code-** PPC703

CO1	To analyse the Indian finance system and corporate finance.
CO2	To take investment, finance as well as dividend decisions.
CO3	To choose the market based on product deliverables.
CO4	To select the marketing mix for a product.

Subject- Total Quality Management   **Course Code-** PPC704

CO1	Enlist various principles of TQM
CO2	Implement various philosophies of TQM
CO3	Use statistical approach for quality control
CO4	List and explain various TQM Tools
CO5	Explain importance of ISO and quality systems
CO6	Implement quality tools for continuous improvement.

Subject- Project Management & Entrepreneurship   **Course Code-** PPC705

CO1	Describe the fundamental concepts in Project management
CO2	Analyze the various scheduling and planning techniques
CO3	Understand and apply suitable strategy for any specific project
CO4	Apply project management principles in business situations to optimize resource utilization and time.
CO5	Demonstrate skills needed to run a successful business.

Subject- Department Elective – II (Advanced Food Packaging)   **Course Code-** PPDE7011

CO1	Choose a packaging material with suitable permeability value as required.
CO2	Describe & perform the migration analysis for packaging materials.
CO3	Evaluate the shelf life of packaged food product.
CO4	Describe the filling system & suggest a suitable one on the basis of product need.
CO5	Apply concepts of microbial inactivation for retort & aseptic packaging.

Subject- Dept. Elective – II (Advanced Industrial Products Packaging)   **Course Code-** PPDE7012

CO1	Effectively choose packaging materials based on characteristics of industrial products.
CO2	Describe the various properties & defects of wood packaging material
CO3	Analyze the various hazards & environmental issues related to Packaging and select a specific protection method for the product.
CO4	Choose various bulk carriers for industrial packaging based on the type of product.

Subject- Dept. Elective – II (Labelling Technology)   **Course Code-** PPDE7013

CO1	Explain and compare the different types of labels, their features and manufacturing process.
CO2	Explain the process of printing, finishing and applying labels on the packs.
CO3	Select a type of label and material based on the package type.
CO4	Design the labels of all types along with the compensations.
CO5	Describe the new trends in the labelling industry.

Subject- ILO Course (Product Lifecycle Management)   **Course Code-** ILO7011

CO1	Gain knowledge about phases of PLM, PLM strategies and methodology for PLM feasibility study and PDM implementation
CO2	Illustrate various approaches and techniques for designing and developing products.
CO3	Apply product engineering guidelines / thumb rules in designing products for moulding, machining, sheet metal working etc.
CO4	Acquire knowledge in applying virtual product development tools for components, machining and manufacturing plant
CO5	Apply environmental aspects in product design.
CO6	Iiiustrate various approaches and techniques in Life Cycle cost Assessment and Analysis.

Subject- ILO Course (Management Information System)   **Course Code-** ILO7013

CO1	Explain how Information Systems transform Business
CO2	Discuss the importance of Data and Knowledge Management.
CO3	Analyse the various ethical issues and privacy concepts related to Information Systems.
CO4	Examine the role of Social Computing in today's society.
CO5	Describe how Computer Networks are backbones for Information Systems.
CO6	Identify the types of systems used for enterprise-wide knowledge management and how they provide value for the business.

Subject- ILO Course (Operation Research)   **Course Code-** ILO7015

CO1	Apply OR techniques to formulate and solve real-world problem.
CO2	Develop an integrated framework for strategic thinking and problem solving
CO3	Identify mathematical tools that are needed to solve optimisation problems
CO4	Identify appropriate decision making approaches and apply tools to be used.
CO5	Analyse situations in manufacturing environment and optimizing the solution
CO6	Identify features of operations and production management and provide solution

Subject- ILO Course (Cyber Security and Laws,)   **Course Code-** ILO7016

CO1	Understand the concept of cybercrime and its effect on outside world
CO2	Understand different cyber offences and cyber crime on different environment
CO3	Analyse various tools used in performing cybercrime
CO4	Understand the legal requirement of cyberspace
CO5	Distinguish different aspects of cyber law
CO6	Identify the need for different Information Security Standards compliance during software design and development

Subject- ILO Course (- Disaster Management and Mitigation Measures)   **Course Code-** ILO7017

CO1	Able to understand the natural & man made disaster and its relationships with human activities
CO2	To apply the fundamental knowledge of science and engineering to asses disater and risk management.
CO3	To develop guidelines and procedures for disater and safety issues obeying the disater management laws and regulations.
CO4	Acquire skills for scientific problem-solving related mitigation of disater.
CO5	Explain simple do's and don'ts in such extreme events and act accordingly.
CO6	Plan of national importance structures based upon the previous history.

Subject- Packaging Distribution & Logistics Laboratory   **Course Code-** PPL 701

CO1	Evaluate the usage & application of Unit Load Devices.
CO2	To explain and perform transport worthiness tests for a given package.
CO3	Choose the test to be performed on a package based on the transportation mode and its requirements.

Subject- Dept Elective-II (Advanced Food Packaging Laboratory) **Course Code-** PPDEL7011

CO1	Choose a packaging material with suitable permeability value as required.
CO2	Describe & perform the migration analysis for packaging materials.
CO3	Evaluate the shelf life of packaged food product.
CO4	Describe the filling system & suggest a suitable one on the basis of product need.
CO5	Apply concepts of microbial inactivation for retort & aseptic packaging.

Subject- Dept Elective-II (Adv. Industrial Products Packaging Laboratory) **Course Code-** PPDEL7012

CO1	Effectively choose packaging materials based on characteristics of industrial products.
CO2	Describe the various properties & defects of wood packaging material
CO3	Analyze the various hazards & environmental issues related to Packaging and select a specific protection method for the product.
CO4	Choose various bulk carriers for industrial packaging based on the type of product.

Subject- Dept Elective-II (Labelling Technology Laboratory)   **Course Code-** PPDEL7013

CO1	Explain and compare the different types of labels, their features and manufacturing process.
CO2	Explain the process of printing, finishing and applying labels on the packs.
CO3	Select a type of label and material based on the package type.
CO4	Design the labels of all types along with the compensations.

Subject- Printing & Packaging Costing Tutorial   **Course Code-** PPT 701

CO1	Enlist the various cost factors involved in a package or a printed job.
CO2	Estimate costing for various print jobs.
CO3	Estimate costing for various package forms.

Subject- Mini-Project   **Course Code-** PPP 701

CO1	Do literature survey and identify the problem.
CO2	Apply basic engineering fundamental in the domain of practical applications.
CO3	Cultivate the habit of working in a team
CO4	Attempt a problem solution in a right approach.
CO5	Prepare report as per the standard guidelines.

Subject- Industrial Training & Project   **Course Code-** PPC 801

CO1	Exhibit the corporate culture/ethics in their work-space/career.
CO2	Identify the size and scale of operations in Industry.
CO3	Accomplish allotted tasks within deadlines
CO4	Demonstrate an understanding of various constraints in industry.
CO5	Learn problem solving techniques and also work as a team.
CO6	Apply the knowledge learnt in their own career.