



The Kavery Engineering College

(Approved by AICTE, New Delhi & Affiliated to Anna University)
Mecheri, Mettur Tk. Salem Dt - 636 453.

DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAMME: M. E. PRODUCT DESIGN AND DEVELOPMENT

VISION

- ❖ To deliver high quality education that creates new opportunities for students to meet the challenges and in pursuit of excellence in Mechanical Engineering.

MISSION

- ❖ To provide a sound mechanical engineering education for a successful career.
- ❖ To facilitate team work and culture to improve the social standards of graduates.
- ❖ To strengthen the industry institute interaction.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- ❖ To prepare students to excel in new product design and development through application of knowledge and practical skills.
- ❖ To provide students with a solid foundation in mathematical modeling of engineering problems required for bringing new products fast into the market.
- ❖ To provide students with required scientific and engineering knowledge so as to comprehend, analyze, design and create innovative products and solutions for real life problems.

PROGRAM OUTCOMES (POs)

- ❖ Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- ❖ Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- ❖ Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- ❖ Conduct Investigations of Complex Problems: Use research-based knowledge and research methods



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including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

- ❖ Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- ❖ The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- ❖ Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- ❖ Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- ❖ Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- ❖ Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- ❖ Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- ❖ Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- ❖ Apply the knowledge gained from the principles of product design, development and management in innovating new products.
- ❖ Investigate research oriented problems through creativity to design, develop and manage innovative new products with due consideration for environmental and social impacts.
- ❖ Pursue professional careers as an individual in design industry and shall demonstrate abilities to communicate their creative ideas in the product design and manage the product development of new products.



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COURSE OUTCOMES (COs)

Regulation	2021
Semester	01
Course Code	ED4153
Course Name	Computer Applications in Design
Course Outcome	<ul style="list-style-type: none">❖ Solve 2D and 3D transformations for the basic entities like line and circle.❖ Formulate the basic mathematics fundamental to CAD system.❖ Use the different geometric modeling techniques like feature based modeling, surface modeling and solid modeling.❖ Create geometric models through animation and transform them into real world systems.❖ Simulate assembly of parts using Computer-Aided Design software.

Regulation	2021
Semester	01
Course Code	PD4153
Course Name	Reverse Engineering
Course Outcome	<ul style="list-style-type: none">❖ Apply the fundamental concepts and principles of reverse engineering in product design and development.❖ Apply the concept and principles material characteristics, part durability and life limitation in reverse engineering of product design and development.❖ Apply the concept and principles of material identification and process verification in reverse engineering of product design and development.❖ Apply the concept and principles of data processing, part performance and system compatibility in reverse engineering of product design and development.❖ Analyze the various legal aspect and applications of reverse engineering in product design and development.

Regulation	2021
Semester	01



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Course Code	PD4151
Course Name	Creativity and Innovation
Course Outcome	<ul style="list-style-type: none">❖ Apply the principles of essential theory of creativity in new product design and development.❖ Apply the principles of various methods and tools for creativity in new product design and development.❖ Apply the design principles of creativity in new product design and development.❖ Apply the various innovation principles and practices in new product design and development.❖ Apply the principles of innovation management in new product design and development.

Regulation	2021
Semester	01
Course Code	PD4152
Course Name	Integrated Product Development
Course Outcome	<ul style="list-style-type: none">❖ Apply the principles of generic development process; product planning; customer need analysis for new product design and development.❖ Set product specifications and generate, select, screen, test concepts for new product design and development.❖ Apply the principles of product architecture, industrial design and design for manufacturing principles in new product development.❖ Apply the adopt Prototyping techniques and Design of Experiment principles to develop a robust design and document a new product for patent.

Regulation	2021
Semester	01
Course Code	RM4151
Course Name	Research Methodology and IPR
Course Outcome	<ul style="list-style-type: none">❖ Understand the research problem and research process.❖ Understand research ethics.



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	<ul style="list-style-type: none">❖ Prepare a well-structured research paper and scientific presentations.❖ Explore on various IPR components and process of filing.❖ Understand the adequate knowledge on patent and rights.
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Regulation	2021
Semester	01
Course Code	ED4080
Course Name	Tribology In Design
Course Outcome	<ul style="list-style-type: none">❖ Develop the knowledge on the surface features and its role on the friction behavior of metals and nonmetals.❖ Understand the various types of wear mechanism and surface modification techniques.❖ Familiarize the different types of lubricants and lubrication systems in the tribology.❖ Methodology for deciding lubricants and lubrication regimes for different operating conditions.❖ Ability to understand the different types of high pressure contacts and rolling bearings.

Regulation	2021
Semester	01
Course Code	PD4111
Course Name	CAD Laboratory and Multibody Dynamics Laboratory
Course Outcome	<ul style="list-style-type: none">❖ With laboratory classes, it helps the students to get familiarized with the computer applications in design and preparing drawings for various mechanical components.❖ The students get familiarized with modeling different systems and importing them into the multi body dynamic software.❖ The students will be trained to obtain required dynamic properties by conducting multi body dynamic tests.❖ The students will learn how to use this data in additional stress analysis software.



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Regulation	2021
Semester	01
Course Code	PD4112
Course Name	Reverse Engineering Laboratory
Course Outcome	<ul style="list-style-type: none">❖ Apply the fundamental concepts and principles of reverse engineering in product design and development.❖ Apply the concept and principles material characteristics, part durability and life limitation in reverse engineering of product design and development.❖ Apply the concept and principles of material identification and process verification in reverse engineering of product design and development.❖ Apply the concept and principles of data processing, part performance and system compatibility in reverse engineering of product design and development.❖ Analyze the various legal aspect and applications of reverse engineering in product design and development.

Regulation	2021
Semester	02
Course Code	ED4251
Course Name	Finite Element Methods in Mechanical Design
Course Outcome	<ul style="list-style-type: none">❖ Develop mathematical models for one dimensional problems and their numerical solutions.❖ Determine field variables for two dimensional scalar and vector variable problems.❖ Apply Isoparametric transformation and numerical integration for evaluation of element matrices.❖ Apply various solution techniques to solve Eigen value problems.❖ Formulate solution techniques to solve non-linear problems.

Regulation	2021
Semester	02
Course Code	PD4251



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Course Name	Designing with Advanced Materials
Course Outcome	<ul style="list-style-type: none">❖ Analyze the different strengthening and failure mechanism of the metals.❖ Apply the effects of metallurgical parameters in the materials design.❖ Analyze the relationship between the selection of materials and processing.❖ Develop the novel material through understanding the properties of the existing metallic materials.❖ Analyze the different materials used in the engineering applications.

Regulation	2021
Semester	02
Course Code	CM4152
Course Name	Solid Freeform Manufacturing
Course Outcome	<ul style="list-style-type: none">❖ Relate the importance in the evolution of SFM/AM, proliferation into the various fields and its effects on supply chain.❖ Analyze the design for AM and its importance in the quality of fabricated parts.❖ Build knowledge on principles and applications of polymerization and sheet lamination processes with case studies.❖ Explain the principles of material extrusion and powder bed fusion processes and design guidelines.❖ Elaborate jetting and direct energy deposition processes and their applications.

Regulation	2021
Semester	02
Course Code	MF4071
Course Name	Design for Manufacture and Assembly
Course Outcome	<ul style="list-style-type: none">❖ To impart the knowledge about the significance of design for manufacturing and assembly.❖ To apply the principle of tolerancing in design.❖ Evaluate the process of GD & T using design guidelines.❖ Apply tolerance allocation and tolerance charting in design.❖ Apply guidelines for manufacturing and assembly.



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Regulation	2021
Semester	02
Course Code	CD4151
Course Name	Concepts of Engineering Design
Course Outcome	<ul style="list-style-type: none">❖ Appreciate the aspects of the need for design, design process used for designing various components.❖ Get familiarized with concepts related to legal, human, and marketing factors during the design of products.❖ Get acquainted with the knowledge of designing creative components.❖ Gain knowledge on the material selection process and various design procedures.❖ Get equipped with tools for improving quality, reliability, and performance of a product.

Regulation	2021
Semester	02
Course Code	CD4072
Course Name	Industrial Robotics and Expert Systems
Course Outcome	<ul style="list-style-type: none">❖ Understand robot kinematics.❖ Incorporate mechanical components and concepts in robotics.❖ Understand the basics of various sensors to effectively design a robot.❖ Design suitable robots for specific applications.❖ Optimize the robots using Artificial Intelligence.

Regulation	2021
Semester	02
Course Code	PD4211
Course Name	Advanced Analysis and Simulation Laboratory
Course Outcome	<ul style="list-style-type: none">❖ Solve engineering problems numerically using Computer Aided Finite Element Analysis packages.

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Semester	02
Course Code	PD4261
Course Name	Product Design Laboratory
Course Outcome	<ul style="list-style-type: none">❖ Appreciate the use of physical prototype models for evaluating product concept.❖ Apply theoretical knowledge to design and development of physical products using clay, wood, sheet metal and RP techniques.

Regulation	2021
Semester	03
Course Code	PD4351
Course Name	Product Life Cycle Management
Course Outcome	<ul style="list-style-type: none">❖ Summarize the history, concepts and terminology of PLM.❖ Use the functions and features of PLM/PDM.❖ Use different modules offered in commercial PLM/PDM tools.❖ Implement PLM/PDM approaches for industrial applications.❖ Integrate PLM/PDM with legacy data bases, CAx& ERP systems.

Regulation	2021
Semester	03
Course Code	PD4004
Course Name	Quality and Financial Concepts in Product Development
Course Outcome	<ul style="list-style-type: none">❖ Apply the concept and principles of quality tools such as seven old and new tools of quality, SPC, multivariate charts, box plots, Pareto charts in product development.❖ Apply the concept and principles of quality tools such as benchmarking, QFD, HoQ, and reliability in product development.❖ Apply the concept and principles of Six Sigma and Lean manufacturing in product development.❖ Apply the concept and principles of robust design and embodiment design in product development.❖ Apply the concept and principles of finance and working capital management in product development.



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Regulation	2021
Semester	03
Course Code	PD4006
Course Name	Human Factors Engineering in Product Design
Course Outcome	<ul style="list-style-type: none">❖ Apply the fundamental concepts and principles of ergonomics in product design and development.❖ Apply the concept and principles of work place design in product design and development.❖ Apply the concept and principles of equipment design in product design and development.❖ Apply the concept and principles of environmental design in product design and development.❖ Apply the concept and principles of cognitive ergonomics & human factor application in product design and development.

Regulation	2021
Semester	03
Course Code	PD4311
Course Name	Project Work I
Course Outcome	<ul style="list-style-type: none">❖ At the end of the course the students will have a clear idea of their area of work and they will be in a position to carry out the remaining phase II work in a systematic way.

Regulation	2021
Semester	04
Course Code	PD5411
Course Name	Project Work II
Course Outcome	<ul style="list-style-type: none">❖ On completion of the project work students will be in a position to take up any challenging practical problem in the field of engineering design and find better solutions to it.