

## ME359 Product Design & Simulation

L	T	P	Credit	Area		CWS	PRS	MTE	ETE	PRE
3	0/1	2/0	4	DEC/GEC		15/25	25	20/25	40/50	-

**Objective:** To enable the students to understand the basics of various stages of the design process, product life cycle, Value analysis. To understand Concept of reengineering and System Simulation.

Syllabus								Contact Hours
<b>Unit-1</b>	<b>Stages in design process:</b> Introduction to various stages of the design process: Formulation of problem, Generate alternatives, Evaluation, Guided Redesign. Case study.							<b>6</b>
<b>Unit-2</b>	<b>Product life cycle:</b> New product introduction: early introduction, increased product life. Life cycle management tool, System integration, QFD, House of quality, Pugh's method, Pahl and Beitz method. Case studies <b>Value engineering:</b> Introduction, nature and measurement of value. Value analysis job plan. Creativity. Value analysis test. Case studies							<b>8</b>
<b>Unit-3</b>	<b>Concurrent/ reverse engineering:</b> Introduction, basic principles, components, benefits of concurrent engineering. Concept of reengineering <b>Material selection:</b> Materials in design. The evolution of engineering materials. Design tools and material data. Material selection strategy, attribute limits, selection process, material selection. Case studies							<b>8</b>
<b>Unit-4</b>	<b>Process selection:</b> Introduction. Process classification: shaping, joining and finishing. Systematic process selection, process cost. Computer – aided process selection							<b>6</b>
<b>Unit-5</b>	<b>Design for manufacture and assembly:</b> Design for Manufacture and Assembly (DFMA). Reasons for not implementing DFMA. Advantages of DFMA with case studies. Design features and requirements with regard to assembly, Design for Manufacture in relation to any two manufacturing processes: machining and injection molding. Need, objectives							<b>6</b>
<b>Unit-6</b>	<b>System Simulation:</b> Techniques of simulation, Monte Carlo method, Experimental nature of simulation, Numerical computation techniques, Continuous system models, Analog and Hybrid simulation, Feedback systems, Computers in simulation studies, Simulation software packages <b>Simulation of Mechanical Systems:</b> Building of Simulation models, Simulation of translational and rotational mechanical systems, Simulation of hydraulic systems							<b>8</b>
<b>Total</b>								<b>42</b>

Reference Book:	
1	David G Ullman, "The Mechanical Design Process." Publisher- McGrawhillIncSingapore, ISBN-13: 9780072975741, 1992.
2	Kevin Otto & Kristin Wood Product Design: "Techniques in Reverse Engineering and new Product Development." 1 / e 2004 , Publisher- Pearson Education New Delhi , ISBN-13: 9780130212719,
3	L D Miles "Value Engineering."Publisher- McGraw-Hill, 1972
4	Karl T Ulrich, Steven D Eppinger , " Product Design &Development."Publisher- Tata McGrawhill New Delhi, ISBN-13: 9780078029066, 2003
5	Hollins B & Pugh S "Successful Product Design." Publisher- Butter worths London, ISBN 9780408038614.
6	N J M Roozenberg , J Ekels , N F M Roozenberg " Product Design Fundamentals and Methods ."Publisher- John Willey & Sons, ISBN-13: 9780471954651, 1995.

## Course Outcomes

CO1	Approaching different product design techniques
CO2	Use product development process, requirements setting, conception design.
CO3	Apply basic knowledge in product development management
CO4	Know customer needs and their impact
CO5	Apply knowledge in product design for manufacturing and productivity.
CO6	Able to simulate the mechanical systems

## CO-PO/PSO Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	0	0	0	0	0	0	2	2	1	1
CO2	3	3	2	3	1	0	0	0	0	0	0	1	2	1	1
CO3	3	3	3	3	1	0	0	0	0	0	0	2	3	3	2
CO4	3	3	3	3	1	0	0	0	0	0	0	1	3	3	2
CO5	2	2	2	2	2	0	0	0	0	0	0	1	2	2	2