

**DESIGN FOR MANUFACTURING AND ASSEMBLY (DFMA)**

<b>CourseCode</b>		<b>Year</b>		<b>Semester</b>	
<b>Course Category</b>	HONORS	<b>Branch</b>	ME	<b>Course Type</b>	Theory
<b>Credits</b>	3	<b>L – T – P</b>	3 – 0 – 0	<b>Prerequisites</b>	Design of Machine Elements
<b>Continuous Internal Evaluation</b>	30	<b>Semester End Evaluation</b>	70	<b>Total Marks</b>	100

**Course Outcomes:** Upon successful completion of the course, the student will be able to

	<b>Statement</b>	<b>Skill</b>	<b>BTL</b>	<b>Units</b>
<b>CO1</b>	Understand the principles of design for manufacturing processes, manual and automated assembly, economical production and material selection.	Understand	L2	1,2,3,4,5
<b>CO2</b>	Apply design rules for ease of forming, machining, casting and assembly.	Apply	L3	2,3,4,5
<b>CO3</b>	Analyse components using design features to facilitate forming, machining and casting.	Analyse	L4	2,3,4

**Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3: High, 2: Medium, 1:Low)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	3	3			1	1	2				2	3	2
<b>CO2</b>	3	3	3			1	1	2				2	3	2
<b>CO3</b>	3	3	3			1	1	2				2	3	2

**Syllabus**

<b>UNIT</b>	<b>Contents</b>	<b>Mapped COs</b>
<b>I</b>	Introduction: Design Philosophy - steps in design process - General design rules for manufacturability - Basic principles of designing for economical production-creativity in design Materials: Selection of materials for design - Developments in materials technology - Criteria for materials selection - Material selection inter relationship with process selection	<b>CO1, CO2</b>
<b>II</b>	Design for Forming: Working principle, Material, Manufacture, Design - Possible solutions - Materials choice - Influence of materials on form design - form design of welded members, forgings and castings.	<b>CO1, CO2, CO3</b>
<b>III</b>	Design for Machining: Design features to facilitate machining - drills - milling cutters - keyways – Doweling procedures, counter sunk screws - Reduction of machined area- simplification by separation - simplification by amalgamation - Design for machinability	<b>CO1, CO2, CO3</b>
<b>IV</b>	Design for Casting: Redesign of castings based on Parting line considerations - Minimizing core requirements, machined holes, redesign of cast members to obviate cores. Identification of uneconomical design -	<b>CO1, CO2, CO3</b>

	Modifying the design.	
V	Design for Assembly: Design guidelines for manual assembly, large assemblies, analysis of an assembly, rules for product design for automation, design for robot assembly, Design for manufacture and Computer aided design.	CO1, CO2

### Learning Resources

**Text books:**

1.A K Chitale and R C Gupta, Product Design and Manufacturing, Prentice Hall of India, New Delhi, 2003.

2.Geoffrey Boothroyd, Dewhurst P and Knight W, Product design for manufacture and assembly, CRC press, 2002.

**Reference books:**

1.James G. Bralla, Design for Manufacturability handbook, McGraw hill, 1999.

2.George E. Dieter, Engineering Design - A material processing approach, 5/e, McGraw Hill International, 2003.

3.ASM Handbook, Design for manufacture, 2000.

4.M F Ashby and K Johnson, Materials and Design - the art and science of material selection in product design, Butterworth-Heinemann, 2003.

5.K G Swift and J D Booker, Process selection: from design to manufacture, London: Arnold, 1997.