

DESIGN FOR MANUFACTURING AND ASSEMBLY (DFMA)

CourseCode	20ME6703	Year	IV	Semester	I
Course Category	HONORS	Branch	ME	Course Type	Theory
Credits	4	L – T – P	3 – 1 – 0	Prerequisites	Design of Machine Elements
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

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

	Statement	Skill	BTL	Units
CO1	Understand the principles of design for manufacturing processes, manual and automated assembly, economical production and material selection.	Understand	L2	1,2,3,4,5
CO2	Apply design rules for ease of forming, machining, casting and assembly.	Apply	L3	2,3,4,5
CO3	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
CO1	3	3	3			1	1	2				2	3	2
CO2	3	3	3			1	1	2				2	3	2
CO3	3	3	3			1	1	2				2	3	2

Syllabus

UNIT	Contents	Mapped COs
I	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	CO1, CO2
II	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.	CO1, CO2, CO3
III	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	CO1, CO2, CO3
IV	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 -	CO1, CO2, CO3

	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.