

Syllabus for Masters of Technology

Subject Code: 01CA0105

Subject Name: Design for Manufacturing and Assembly

M.Tech. (I Year) Semester-I: CAD/CAM

Type of course: Program Elective

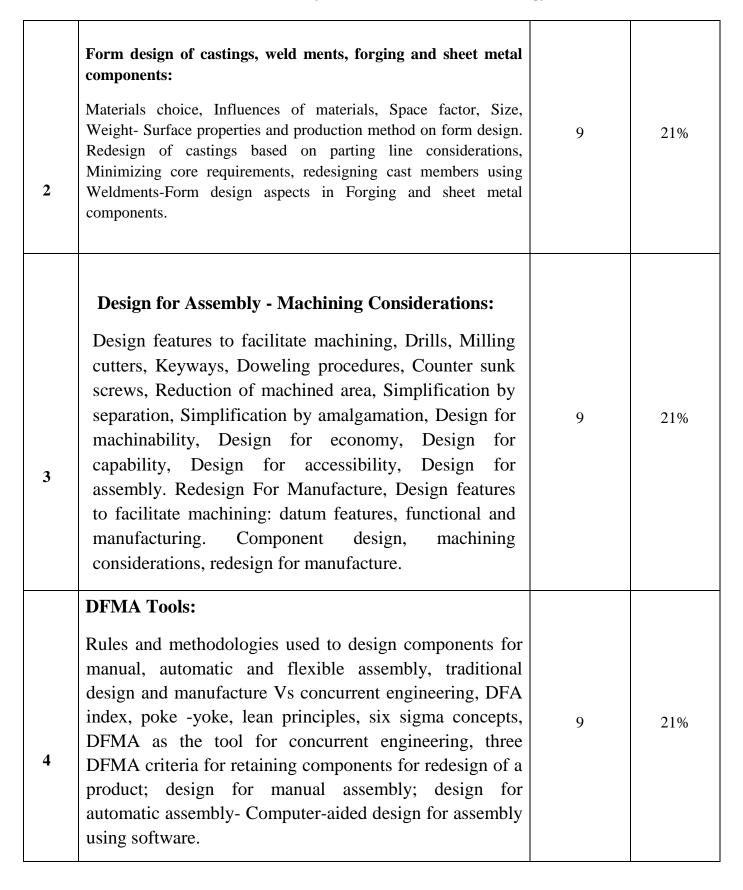
Rationale: The course is intended to strengthen fundamentals of applied mechanics of solids and build understanding of design and analysis of machine components under dynamic loading. The course introduces design and analysis of machine components at elevated temperature. The course also includes fundamentals and application of fracture mechanics and surface failures in machine component design.

Teaching and Examination Scheme:

Teaching Scheme		Credits	Examination Marks						
				Theory Marks			Practical Marks		Total Marks
L	Т	Р	C	ESE	IA	CSE	VIVA	TW	WIAIKS
4		2	5	50	30	20	25	25	150

Sr. No	Topics	Teaching Hours	Module weight age
1	Tolerances: Limits and Fits, tolerance Chains and identification of functionally important dimensions. Dimensional chain analysis- equivalent tolerances method, equivalent standard tolerance grade method, equivalent influence method. Geometric tolerances: applications, geometric tolerance for manufacture as per Indian Standards and ASME Y 14.5 standard; surface finish, Tolerance stackup calculations; Review of relationship between attainable tolerance grades and different machining	7	18%

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5	Design for the Environment: Introduction, Environmental objectives, Global issues, Regional and local issues, Basic DFE methods, Design guide lines, Weighted sum assessment method, Lifecycle assessment method, Techniques to reduce environmental impact, Design to minimize material usage, Design for disassembly, Design for Recyclability, Design for remanufacture, Design for energy efficiency, Design to required and standards.	8	19%
	remanufacture, Design for energy efficiency, Design to regulations and standards		

R Level	U Level	A Level	N Level	E Level
15	30	25	15	15

Reference Books:

1. Product Design for Manufacture and Assembly, G. Boothroyd, P. Dewhurst, W.

A. Knight, CRC Press.

2. Assembly Automation and Product Design, G. Boothroyd, CRC Press.

3. Product Design and Development, K. T. Ulrich and S. D. Eppinger, McGraw-Hill Higher Education

4. Handbook of Product Design for Manufacturing, Bralla, James G., McGraw Hill.

5. Engineering Design - A Material Processing Approach, G E Dieter, McGraw Hill

6. Mechanical Tolerance stackup and analysis, B. R. Fischer, CRC Press.

7. Mechanical assemblies: their design, manufacture, and role in product development, D E Whitney Oxford Press.

Course Outcome:

After learning the course the students should be able to:

1. Understand the quality aspects of design for manufacture and assembly.



2. Apply various techniques of DFM for product design and assembly.

3. Apply the concept of designs for casting, welding, forming and assembly.

4. Identify the design factors and processes along customer desires for manufacturing.

List of Experiments:

Following is the list of representative exercises. More exercises should be developed.

1. For a given products/component, identify differences and dissimilarities between Design for Manufacturing and Design for Assembly.

2. Perform an exercise to identify features (self-locating, self-fastening, minimize orientation during assembly, retrieval, handling and insertion, symmetry) for assembly of a component.

3. Redesign: Perform exercise for a product to minimize number of parts without compromising its function.

4. Tolerance stack up analysis: Worst Case tolerance analysis, Statistical tolerance analysis

5. Geometric Dimensioning and Tolerancing in Tolerance Analysis.

6. Design evaluation of the components on the basis of casting, welding and machining requirements.

7. Design and manufacture of a plug gauge.