III B. Tech – II Semester

(20ME6644) DESIGN OF MANUFACTURING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	4

Pre-Requisites: Machine design, Manufacturing technology

Course Objectives:
The Students will acquire the knowledge:

- To interpret the appropriate design for economical production and select the materials.
- To discuss the Selection between various machining and metal joining processes.
- To outline the systematic understanding of knowledge in the field of metal casting and forging.
- To discuss Fabricate basic parts and assemblies using powered and non – powered machine shop equipment in conjunction with mechanical documentation.
- To outline the Integration of the knowledge of compliance analysis and interference analysis for assembly and also use visco-elastic and creep in plastics.

UNIT-I: Introduction:
Design philosophy – steps in design process – general design rules for manufacturability – basic principles of designing for economical production – creativity in design, application of linear & non-linear optimization techniques. Materials: Selection of materials for design – developments in material technology – criteria for material selection – material selection interrelationship with process selection – process selection charts.

UNIT-II: Machining process:
Overview of various machining processes – general design rules for machining - dimensional tolerance and surface roughness – design for machining – ease – redesigning of components for machining ease with suitable examples, general design recommendations for machined parts. Metal joining: Appraisal of various welding processes, factors in design of weldments – general design guidelines – pre and post treatment of welds – effects of thermal stresses in weld joints – design of brazed joints.

UNIT-III: Metal casting:
Appraisal of various casting processes, selection of casting process, - general design considerations for casting – casting tolerances – use of solidification simulation in casting design – product design rules for sand casting. Forging: Design factors for forging – closed die forging design – parting lines of dies – drop forging die design – general design recommendations.

UNIT-IV: Extrusion and sheet metal work:
Design guidelines for extruded sections - design principles for punching, blanking, bending, and deep drawing – Keeler Goodman forming line diagram – component design for blanking.

UNIT-V: Assembly:
Compliance analysis and interference analysis for the design of assembly – design and development of features for automatic assembly – liaison diagrams. Environment: Introduction to environment; motivations for environment principles of environment- eco-efficiency, product life cycle perspective, environment tools and processes, environment design guidelines.

After successful completion of the course, the students will be able to:

S. No	Course Outcome	BTL
1.	outline the appropriate design for economical production and select the materials.	L2
2.	Select between various machining and metal joining processes.	L2
3.	Apply a systematic understanding of knowledge in the field of metal casting and forging.	L2
4.	Fabricate basic parts and assemblies using powered and non – powered machine shop equipment in conjunction with mechanical documentation.	L2
5.	Integrate the knowledge of compliance analysis and interference analysis for assembly and also use visco-elastic and creep in plastics.	L3

Correlation of COs with POs& PSOs:

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

Text Books

1. A K Chitale and R C Gupta, “Product Design and Manufacturing”, PHI, New Delhi, 2003.
2. Design for manufacture, John cobert, Adisson Wesley. 1995
3. Design for Manufacture by Boothroyd, 2. Design for manufacture, James Bralla

References:

1. George E Deiter, “ Engineering Design”, McGrawHill International, 2002. 2. Boothroyd G,
2. “Product design for Manufacture and Assembly”, First Edition, Marcel Dekker Inc, New York, 1994 ASM Hand book Vol.20