DESIGN FOR MANUFACTURING AND ASSEMBLY
(Elective - I)

Subject Code: 13ME2107 **L P C**
4 0 3

Pre requisites: Production Technology

Course Educational Objectives:
To make the student understand
1. design principles, creativity in design and material selection for design
2. design considerations for machining, casting, forging
3. design considerations for metal joining, extrusion, sheet metal work, plastic processing

Course Outcomes:
The student will be able to
1. Design the machine parts for ease of manufacturing
2. Select appropriate materials and manufacturing processes for the optimum product cost and quality
3. Implement assembly features in design to reduce the assembly time and cost

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

UNIT-V

Plastics: Visco-elastic and creep behaviour in plastics – design guidelines for plastic components – design considerations for injection moulding – design guidelines for machining and joining of plastics

Assembly: Compliance analysis and interference analysis for the design of assembly – design and development of features for automatic assembly – liaison diagrams

TEXT BOOK:

1.A K Chitale, R C Gupta " *Product Design and Manufacturing*", PHI, New Delhi, 2003.

REFERENCES:

1. George E Deiter, " *Engineering Design*", McGrawHill International, 2002.
2. BoothroydG , "*Product design for Manufacture and Assembly*", First Edition, Marcel Dekker Inc, New York, 1994.