DESIGN FOR MANUFACTURING, ASSEMBLY AND ENVIRONMENT
(Elective-I)

Subject Code: 13ME2204 **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 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.

TEXT BOOK:

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

REFERENCES :

1. George E Deiter, " *Engineering Design*", McGrawHill International, 2002.

2. Boothroyd G , "*Product design for Manufacture and Assembly*", First Edition, Marcel Dekker Inc, New York, 1994.