# 20MD014 DESIGN SYNTHESIS

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**Course Description and Objectives:**

Success of a product depends factors like cost , reliability, safety and simplicity in the product. With the globalization, manufacturers need to adopt high end techniques to remain competent in the current market. It is only possible by adopting methods to reduce time for design and reliable product design, reduction of number of sub assemblies, enhancement in quality with better manufacturing techniques. The objective of this course is to acquire the concepts of the product design process and integrating design for manufacturing and design for assembly to arrive at a good quality product in a cost effective way.

**Course Outcomes:**

Upon successful completion of this course student should be able to:

- Analyze various stages involved in the design process
- Apply tolerances and surface finish to design a product
- Select a manufacturing process for different types of components
- Design the product keeping in view assembly , dismantling, maintenance and inspection
- Apply optimization methods for design problems

**SKILLS ACQUIRED**: 1. Need identification and market survey techniques
2. Concept generation and evaluation
3. Manufacturing technique selection based on product
4. Product design based on ergonomics
5. Designing products based on maintenance and inspection

**UNIT–I** **L12**

**Introduction:** Design process – Considerations of a Good design – Detailed description of design process – Need identification - Concept Generation – Decision making and concept selection - Standardization and its application in design.

**UNIT–II** **L12**

**Selection of Materials:** Performance characteristics of materials – Material selection process

**Fits & Tolerances:** Tolerances from process and function - Interchangeability and selective assembly- Selection of fits for different design situations – Surface finish.

**UNIT–III** **L12**

**Design for Manufacturing:** Design for casting, Design for forging, and Design for welding. Design for turning – Design for drilling – Design for milling

**UNIT–IV** **L12**

**Design for assembly**: Design for inspection and maintenance – Design for fasteners.

**Modern approaches to product design:** Concurrent design –Quality function deployment – Additive manufacturing

**UNIT–V** **L12**

**REVERSE ENGINEERING:** Scope and tasks of Reverse Engineering – Domain Analysis – Process Duplicating – Tools for RE – Developing Technical data – Digitizing techniques – Construction of surface model – Solid part model – CMM and its feature capturing – surface and solid modeling

**TEXTBOOKS:**


1. GeorgeE.Dieter, "Engineering Design-AMaterials&Processing Approach", 4th Edition,Mc GrawHillPublishers,2015
2. S.S.Rao,"EngineeringOptimization",4thEdition,JohnWilley&Sons,2009.


**REFERENCEBOOKS:**


1. KevinOtto,KristionWood,"ProductDesign",1st Edition,PearsonPublications,2006.
2. A.K.Chitale, R.C.Gupta, "Product design and Manufacturing", 3rd Edition, PHI Publications,
3. Linda Wills, “Reverse Engineering” Kluwer Academic Press, 2015