

## (ME 506) DESIGN SYNTHESIS

### **Objective of the Course :**

*This course helps the students to understand and apply the key aspects of product design and development concepts of strength, rigidity, manufacturability, aesthetic, ergonomic and economic considerations for a better product.*

### **UNIT – I**

Design process – Considerations of a Good design – Detailed description of design process – Concept Generation and Evaluation - Embodiment design – Standardization and its application in design.

### **UNIT – II**

Tolerances from process and function - Interchangeability and selective assembly- Selection of fits for different design situations - Surface finish.

Strength Considerations in product design - Strength based design – Rigidity based design – Impact based design – Designing for uniform strength. Light weight and rigid constructions.

### **UNIT – III**

Design for Manufacturing – Design of cast, forged, sheet metal parts and welded constructions. Machining considerations during design of a component.

### **UNIT – IV**

Design for assembly and dismantling - Design for inspection and maintenance - Design for the environment – Techniques to reduce environmental impact.

Ergonomic considerations in design - Design of controls and displays

Modern approaches to product design – Concurrent design – Quality function deployment - rapid prototyping.

### **UNIT – V**

Optimization in design – Problem formulation for design optimization - Linear programming – Geometric programming - Application to machine design problems.

### **TEXT BOOKS:**

1. George E.Dieter, "Engineering Design - A Materials & Processing Approach", 3<sup>rd</sup> Edition, Mc Graw Hill Publishers, 2008.
2. S.S.Rao, "Engineering Optimization", 4<sup>th</sup> Edition, John Willey & Sons, 2009.

### **REFERENCE BOOKS:**

1. Kevin Otto, Kristion Wood, "Product Design", 1<sup>st</sup> Edition, Pearson Publications, 2006.
2. A.K.Chitale, R.C.Gupta, "Product design and Manufacturing", 3<sup>rd</sup> Edition, PHI Publications, 2005.