

<b>Course Code</b>	<b>MEE104B</b>			
<b>Course Category</b>	<i>Core Engineering</i>			
<b>Course Title</b>	<b>Design Thinking Laboratory</b>			
<b>Teaching Scheme and Credits</b>	<b>L</b>	<b>T</b>	<b>Laboratory</b>	<b>Credits</b>
<b>Weekly load hrs.</b>	-	-	<b>3</b>	<b>1</b>

**Pre-requisites:**

HSC Science, Mathematics, General Knowledge.

**Course Objectives:**

- 1. Knowledge:** (i) To explain basic role of design engineer in the society  
(ii) To illustrate how to execute various steps in engineering design and identify design parameters and constraints.  
(iii) To explain how to utilize scientific knowledge to solve societal problems.
- 2. Skills** (i) To communicate the design concept.
- 3. Attitude** (i) To develop problem solving approaches and skills while working as a team member; by identifying and utilizing appropriate tools.

**Course Outcomes:**

After completing the course, student will be able to

1. Recognize role of engineer in various engineering disciplines.(CL – I)
2. Explain and apply design process by incorporating the requirements within the constraints.(CL – III)
3. Demonstrate the use of scientific knowledge to solve the design problem.(CL – III)
4. Work in a team to design products and systems to solve real life problems.(CL – VI, III)

**Course Contents:** (*All are Compulsory*)

**Laboratory Exercises / Practical:**

1. Introduction to Engineering Design and design thinking (Individual Activity) - 2 hrs
2. Reading and Understanding an existing design (Group of 2 students) - 4 hrs
3. Design Project Part I -Brainstorming , problem identification (Group Activity) – 3 hrs
4. Design Project Part II – Need identification and Concept Generation (Group Activity) – **3 hrs**

5. Design Project Part III – Generation and Evaluation of Alternative Concepts (Group Activity)–3 hrs
6. Design Project Part IV- Product Architecture (Group Activity) – 3 hrs
7. Design Project Part V– Design For ‘X’ (Group Activity) – 3 hrs
8. Design Project Part VI – Design detailing (Group Activity) – 3 hrs
9. Presentation of Design Project Part VII - (Group Activity) – 3 hrs
10. Demonstration of Modeling and Rapid Prototyping (Demonstration) – 3 hrs

Students will submit a journal based on above experiments at the end of the term along with physical model if any.

### **Learning Resources:**

#### **Reference Books:**

1. P.G. Kosky, G. Wise, R.T. Balmer, W.D. Keat, Exploring Engineering: An Introduction for Freshman to Engineering and to the Design Process, 4<sup>th</sup> ed. Academic Press Publication, 2016.
2. George Dieter, Linda Schmit, Engineering Design, 5<sup>th</sup> ed. McGraw Hill Publication, 2013.
3. Clive M Dym, Patrick Little, Elizabeth J Orwin, Engineering design - A Project Based Introduction, 4<sup>th</sup> ed. Wiley Publication. 2014.

#### **Supplementary Reading:**

1. **Ethics Center** <http://onlineethics.org>  
(Provides engineers, scientists, and science and engineering students with resources for understanding and addressing ethically significant problems that arise in their work, and to serve those who are promoting learning and advancing the understanding of responsible research and practice in science and engineering)

#### **Web Resources:**

1. Read some Indian and international patents.
2. ASTM, IEEE, BIS Standards.
3. ASME codes
4. Product Life cycle issues and environmental issues related to products:  
<https://advisera.com/14001academy/blog/2016/03/21/how-does-product-life-cycle-influence-environmental-aspects-according-to-iso-140012015/>

#### **Web links:**

1. Knovel (<http://knovel.com>) is a web-based engineering information service. It offers direct access to thousands of engineering handbooks
2. ESDU Engineering Data Service, <http://www.esdu.com>
3. How Stuff Works: Simple but very useful descriptions, with good illustrations and some animations, of how technical machines and systems work. <http://www.howstuffworks.com>
4. A world-famous collection of kinematic models. <http://kmoddl.library.cornell.edu>
5. For Engineering Fundamentals, bills itself as the ultimate online reference <http://www.efunda.com>

#### **MOOCs:**

1. Product Design and development NPTEL course  
[https://onlinecourses.nptel.ac.in/noc17\\_me16/preview](https://onlinecourses.nptel.ac.in/noc17_me16/preview)
2. Course on Design thinking and Innovation, by University of Virginia.  
<https://www.coursera.org/learn/uva-darden-design-thinking-innovation>

#### **Pedagogy:**

1. PPT Presentations
2. Audio visual demonstration
3. Project based learning
4. Live Demonstration in Lab

#### **Assessment Scheme:**

##### **Laboratory Continuous Assessment (LCA) : 50 Marks (100% of Total Marks )**

*Assessment will be Based on assessment rubric for each item.*

Understanding Design Philosophy	Concept Generation and Selection	Applying Design Process	Design Report	Presentation (Communication)	Team work	Attendance
5 Marks (10 %)	10 marks (20 %)	10 marks (20 %)	10 Marks (20 %)	5 marks (10 %)	5 Marks (10 %)	5 Marks (10 %)

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