

COURSE TITLE	DESIGN THINKING AND PROBLEM SOLVING SKILLS
COURSE CODE	01EE1305
COURSE CREDITS	1

Objective:

- 1 Design Engineering and Problem Solving is a unique course that exposes students to understand the creative design concepts and application of interdisciplinary as well as interdisciplinary engineering in real life problems. The access and use of different resource will lead all learners to take the knowledge of engineering economy, design consideration and design & product liabilities.

Course Outcomes: After completion of this course, student will be able to:

- 1 Explain the stages/steps of the engineering design process.
- 2 Identify the engineering design process steps in a case study of a design/build example solution.
- 3 Determine whether a design solution meets the project criteria and constraints.
- 4 Apply the engineering design process steps to develop their own innovations to real-life problems.
- 5 Develop a functional prototype, either as a simulation or physical hardware, to validate a proposed design solution.

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
0	0	2	0	0	0	25	25

Contents : Unit	Topics	Contact Hours
1	Creative Product & System Design Creative design, Innovation versus invention,, Globalization, Team work, Project scheduling and management Whole Brain thinking,, Creativity, what makes an individual creative?	4
2	Reclaiming Creativity Mental Barriers, Types of mental Barriers, False assumptions and non-existent limitations,, associating thinking, misunderstandings, inability to communicate properly,, emotions, culture and environment related barriers, improper method of solution	4
3	Phase 1: Evaluation of Idea Activity 01 – Observation: AEIOU Framework, Activities, Environments, Interactions, Objects and Users., Activity 02 - Prior art search	5

Contents : Unit	Topics	Contact Hours
4	Phase 2: Pre-Design Activity 03 - Learning Need Matrix (LNM)	5
5	Phase 3 –Proof of Concept Activity 04 –Prepare prototype	3
6	Phase 4 – Hardware implementation & Customer validation Activity 05 – Assemble and implementation of hardware model	3
Total Hours		24

Textbook :

- 1 Design Thinking: A Guide to Creative Problem Solving for Everyone, Andrew Pressman, Routledge, 2019
- 2 Design Thinking for Strategy, Claude Diderich, Springer, 2020

References:

- 1 The Design Thinking Playbook, The Design Thinking Playbook, Michael Lewrick, Patrick Link, Larry Leifer, Wiley, 2018
- 2 Strategies for Creative Problem Solving, Strategies for Creative Problem Solving, H. S. Fogler and S. E. LeBlanc, Pearson, 2014
- 3 Problem Solving & Comprehension, Problem Solving & Comprehension, A. Whimbey and J. Lochhead, Lawrence Erlbaum, 2013
- 4 Effective Problem Solving, Effective Problem Solving, M. Levine, Prentice Hall, 1994
- 5 Reverse Engineering: Technology of Reinvention, Reverse Engineering: Technology of Reinvention, Wego Wang, CRC Press, 2010

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
20.00	20.00	20.00	20.00	10.00	10.00

Instructional Method:

- 1 The course shall be taught in the mixed mode format of class room learning and field visits.
- 2 Major portion shall be learnt by the students at the field.
- 3 Presence in all sessions is mandatory which shall carry 5% marks of the total internal evaluation.

Instructional Method:

- 4 At the end of each unit/topic the faculty shall evaluate the work by assigning grades to the work done. This shall carry 5% weightage for timely completion and submission of the assigned work.
- 5 The laboratory experiments are planned in such a way that it covers the practical aspects of the course contents. The performance of these experiments shall bring the clarity of the theoretical concepts which the students have studied during the academic sessions.

Supplementary Resources:

- 1 <https://www.smashingmagazine.com/2013/05/50-problems-50-days-part-1-real-empathy-innovation/>
- 2 <https://playerdevelopmentproject.com/breaking-mental-barriers/>
- 3 <https://www.teachengineering.org/k12engineering/designprocess>
- 4 <https://www.electricalindia.in/switchgear/switchgear-case-studies/>
- 5 <http://www.ibscdc.org/industry/engineering-electrical-electronics-case-studies.asp>