Subject Code: 01ME2304
Subject Name: Design Thinking and Problem Solving Skills
B. Tech. Year- II (Semester - 3)

Type of course : Core

Prerequisite : Zeal to learn subject.

Rationale : The main objective of this course is to inculcate interdisciplinary engineering skills in students for taking real time engineering problem available in our society/industry and to come-up with the grass root innovation, can be helpful to all level of human beings.

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

1. Understand the importance of Design Thinking.
2. Evaluate the quality of your information and your emotions.
3. Understand Reverse Engineering methodologies.
4. Identify skills and personality traits of successful problem solving.
5. Apply standard problem-solving heuristics to aid in problem solving.
6. Formulate and successfully communicate the solutions to problems.

Teaching and Examination Scheme :

Teaching Scheme			Credits	Examination Marks					
				Theory Marks			Practical Marks		Total Marks
THEORY	TUTORIAL	PRACTICAL	C	ESE(E)	IA	CSE	Viva (V)	Term Work (TW)	
0	0	2	4	0	0	0	50	50	100

Content :

Sr. No.	Content	Total Hrs.
1	**Module – 1** Design Thinking Introduction Introduction, Need of Design Thinking, Traditional Problem Solving versus Design Thinking, phases of Design Thinking,Tools for Design Thinking, Design Thinking in Engineering.	**04**
2	**Module – 2** Domain Selection Formation of Team and aspects for the selection, Domain selection(Society/Industry project), Strategic Design thinking.	**02**

3	**Module – 3** Design Thinking Exercise Observation exercise, Design activities through Canvas (AEIOU, Mind Mapping, Empathy, Ideation, learning need matrix), Brainstorming for the problem, Users Interview conduction, generation of records.	**06**
4	**Module – 4** Reverse Engineering Forward Engineering Design, Design Thought and Process, Design Steps, Reverse Engineering Steps, System level Design, Engineering Specifications, Product Architecture, Schematic Drawings.	**04**
5	**Module – 5** Problem Solving Skills Developing logical thinking, Introduction to Problem Solving in Mechanical domain, computational problem solving, generating, implementing and evaluating solutions.	**04**
6	**Module – 6** Capstone Project Mini project exercise based on understanding of modules contents, Analyze the economics of the innovation.	**08**

Distribution of Theory Marks

R Level	**U** Level	**A** Level	**N** Level	**E`** Level	**C** Level
20	**30**	**25**	**15**	**10**	--

Legends: R: Remember**; U:** Understand**; A:** Apply**; N:** Analyze**; E:** Evaluate**; C**: Create

Reference books :

a. Claude Dide rich, Design Thinking for Strategy, 1st edition, Springer, 2020.
b. Michael Lewrick & Patrick Link & Larry Leifer, The Design Thinking Playbook,
c. 1st edition, Wiley, 2018.
d. Andrew Pressman, Design Thinking: A Guide to Creative Problem Solving for
e. Everyone, 1st edition, Routledge, 2019.
f. Wego Wang, Reverse Engineering: Technology of Reinvention, 1st edition, CRC
g. Press, 2010.
h. Robert Messler, Reverse Engineering: Mechanisms, Structures, Systems &
i. Materials, 1st edition, McGraw-Hill Education, 2013.
j. H. S. Fogler and S. E. LeBlanc, Strategies for Creative Problem Solving, 3rd edition,
k. Pearson, Upper Saddle River, NJ, 2014.
Whimbey and J. Lochhead, Problem Solving & Comprehension, 7th edition,
l. Lawrence Erlbaum, Mahwah, NJ, 2013.
m. M. Levine, Effective Problem Solving, 2nd edition, Prentice Hall, Upper Saddle River, NJ,1994

Instructional Method:

a. The course delivery method will depend upon the requirement of content and need of

students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

b. The internal evaluation will be done based on continuous evaluation of students in the laboratory.
c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
d. Students will use supplementary resources such as online videos, SWAYAM, NPTEL videos, e-courses, Virtual Laboratory.

List of Open Base Software / learning website :

1. https://swayam.gov.in
2. https://onlinecourses.swayam2.ac.in/aic19_de02/preview
3. https://onlinecourses.nptel.ac.in/noc20_mg38/preview
4. https://www.coursera.org/learn/uva-darden-design-thinking-innovation