

Creativity, Problem Solving and Innovation

01CI0408

Prerequisite: Zeal to learn the subject.

Course Objective: To develop creative thinking skill in the students using cone of learning components leading to understanding of various strategies for creativity, problem solving and innovation.

Course Outcome:

After learning the course, the students will be competent

1. Recognize importance of creativity, problem solving and innovation while addressing science, engineering and social issues.
2. Demonstrate the ability to contextualize knowledge related to professional engineering practices.
3. Demonstrate the functioning effectively as an individual and team member.
4. Extend life-long learning in the context of technological change.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
L	T	P	C	Theory Marks			Practical Marks		
				ESE(E)	IA	CSE	Viva (V)	Term Work	
0	0	2	1	0	30	0	20	0	50

Content:

Sr. No.	Content	Total Hrs
1	Phase 1: To introduce the subject of the course: this course as a needed skill for your future. Psychology of problem solving; Vertical versus Lateral thinking	02
2	Phase 2: Strategy of Questioning; Method of questioning; Importance of asking the right question. Who, what, when, where, why, how?	02
3	Phase 3:	02

	Learning and its importance; Sources of learning; Methods of learning. Purpose and value of education in future creativity in real life.	
4	Phase 4: Strategy of Knowing how to see; Making your thought visible; Visualizing thinking; Mapping of mind, Fishbone diagram.	02
5	Phase 5: Strategy of Thinking Fluency; Generating all possibilities; more the better; Quantity without screening is helpful; SCAMPER technique; Creative or divergent idea generating thinking versus Critical or convergent idea selection thinking.	02
6	Phase 6: Strategy of Fusing of ideas; Making novel combinations; Connecting the unconnected.	02
7	Phase 7: Strategy of Looking at the other side, looking in other world, finding what you are not looking for and following it up.	02
8	Phase 8: Strategy of Play, Importance of play; Diversion; Unstructured activities for sheer joy, Activities for joy, Let subconscious figure it out, Various puzzles as play or fun.	02
9	Phase 9: Strategy of Awakening the collaborative spirit, Collaborative thinking, brain storming, Innovation requires collaboration to make it happen.	02
10	Phase 10: Review Strategies for Creative problem solving methods, Five building blocks as per Fogler & LeBlanc, Stanford D school approach.	02
11	Phase 11: Strategy for critical thinking for Choosing, Creative or divergent thinking needs follow up by Critical thinking or Convergent thinking in order to choose the solution for implementation, Kepner-Tregoe (K.T.) method with an example, Edward De Bono CoRT thinking process including PMI (Plus, Minus and Interesting), Also Edward de Bono method of decision making called Six thinking hats.	02
12	Phase 12: Edward de Bono explaining and teaching his ideas having evolved many years ago consisting as CoRT thinking tool, Lateral thinking and the decision making by Six thinking hats method.	02
13	Phase 13: Strategy for Making; From idea to innovation.	02
14	Phase 14: Individual presentation for 75 minutes by 15 students (5 minutes per student).	04

Reference books:

1. Zig Zag, The surprising path to greater creativity by R. Keith Sawyer. 2013.
2. Group Genius by Keith Sawyer, the creative power of Collaboration. 2007
3. Crackling Creativity, The secrets of creative genius by Michael Michalko. 2001
4. Thinkertoys by Michael Michalko, second edition 2006
5. De Bono's Thinking Course by Edward De Bono, Revised Edition 1994
6. Six Thinking Hats by Edward De Bono Revised and updated edition 1999
7. Lateral thinking, Creativity Step by Step by Edward De Bono. 1973
8. How to Mind Map by Tony Buzan. 2002
9. Mapping Inner Space by Nancy Margulies with Nusa Maal. Second edition.2002
10. The Myths of Innovation by Scott Berkun. Expanded and revised edition 2010
11. The art of Innovation by Tom Kelly with Jonathan Littman. 2001
12. Creative Confidence: Unleashing the Creative Potential Within Us All by Tom Kelly and David Kelly. 2013
13. A Whack on the side of the head by Roger von Oech. Revised edition 1998
14. A Kick in the seat of the pants by Roger von Oech.1986
15. They all laughed by Ira Flatow. 1992
16. Imagine, How creativity works by Jonah Lehrer. 2012
17. 101 Creative problem solving techniques by James m Higgins.1994
18. Creative approach to problem solving by Scott G Isaksen, K Brian Dorval, Donald J Treffinger. 2000
19. Creative problem solving An Introduction by Donald J. Treffinger, Scott G Isaksen and K. Brian Stead=Dorval. 4th edition, 2006
20. Strategies for creative problem solving by H. Scott Fogler & Steven E. LeBlanc. Second edition 2008
21. Game storming by Dave Gray, Sunni Brown and James Macanuf.2010
22. Creating minds by Howard Gardner. 1993
23. Creativity –Flow and Psychology of Discovery and Invention by Mihaly Csikzentmihalyi.1996
24. Aha! Insight by Martin Gardner. 1978
25. The Ultimate Lateral & Critical Thinking Puzzle book by Paul Sloane, Des MacHale & M. A. DiSpezio. 2002
26. Test your Lateral Thinking IQ by Paul Sloane. 1994
27. Intriguing Lateral Thinking Puzzles by Paul Sloane & Des MacHale.1996.