Subject Code: 01CT0521

Subject Name: Creativity, Problem Solving and Innovation

B. Tech. Year – III (Semester V)

Objectives: 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.

Credits Earned: 01 Credit

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

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

Pre-requisite of course: Zeal to learn the subject.

Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
0	0	2	1	00	30	00	20	00	50

Contents:

Unit	Topics	Content Hours
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** Learning and its importance; Sources of learning; Methods of learning. Purpose and value of education in future creativity in real life.	02
4	**Phase 4** Strategy of Knowing how to see; Making your thought visible; Visualizing	02

	thinking; Mapping of mind, Fishbone diagram.	
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
	Total Hours	**30**

Suggested Theory distribution:

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

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
05%	10%	35%	35%	10%	5%

Suggested Text books / 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 Macanufo.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.