

<b>COURSE TITLE</b>	<b>CREATIVITY, PROBLEM SOLVING AND INNOVATION</b>
<b>COURSE CODE</b>	<b>01CE0408</b>
<b>COURSE CREDITS</b>	<b>1</b>

**Objective:**

- 1 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.
- 2 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 Outcomes:** After completion of this course, student will be able to:

- 1 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 Ability to engage in life-long learning in the context of technological change

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

**Teaching and Examination Scheme**

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
0	0	2	0	30	0	20	0

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
<b>Total Hours</b>		

**Suggested List of Experiments:**

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Phase 1</b> To introduce the subject of the course: this course as a needed skill for your future. Psychology of problem solving; Vertical versus Lateral thinking.	2
2	<b>Phase 2</b> Strategy of Questioning; Method of questioning; Importance of asking the right question. Who, what, when, where, why, how?	2

### Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
3	<b>Phase 3</b> Learning and its importance; Sources of learning; Methods of learning. Purpose and value of education in future creativity in real life.	2
4	<b>Phase 4</b> Strategy of Knowing how to see; Making your thought visible; Visualizing thinking; Mapping of mind, Fishbone diagram.	2
5	<b>Phase 5</b> 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.	2
6	<b>Phase 6</b> Strategy of Fusing of ideas; Making novel combinations; Connecting the unconnected.	2
7	<b>Phase 7</b> Strategy of Looking at the other side, looking in other world, finding what you are not looking for and following it up.	2
8	<b>Phase 8</b> 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.	2
9	<b>Phase 9</b> Strategy of Awakening the collaborative spirit, Collaborative thinking, brain storming, Innovation requires collaboration to make it happen.	2
10	<b>Phase 10</b> Review Strategies for Creative problem solving methods, Five building blocks as per Fogler & LeBlanc, Stanford D school approach.	2
11	<b>Phase 11</b> 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.	2
12	<b>Phase 12</b> 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.	2
13	<b>Phase 13</b> Strategy for Making; From idea to innovation.	2

### Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
14	<b>Phase 14</b> Individual presentation for 75 minutes by 15 students (5 minutes per student).	4
<b>Total Hours</b>		<b>30</b>

### Textbook :

- 1 The surprising path to greater creativity , R. Keith Sawyer, Zig Zag, 2013

### References:

- 1 The creative power of Collaboration, The creative power of Collaboration, Keith Sawyer, Group Genius, 2007
- 2 The secrets of creative genius , The secrets of creative genius , Michael Michalko., Crackling Creativity,, 2001
- 3 Thinkertoys, Thinkertoys, Michael Michalko, Ten Speed Press, 2006
- 4 De Bono's Thinking Course, De Bono's Thinking Course, Edward De Bono., BBC Books, 1994
- 5 Six Thinking Hats, Six Thinking Hats, Edward De Bono , Penguin Books Ltd, 2017
- 6 Lateral thinking, Creativity Step by Step, Lateral thinking, Creativity Step by Step, Edward De Bono, HarperCollins, 2010
- 7 How to Mind Map, How to Mind Map, Tony Buzan, Thorsons; Illustrated edition, 2002
- 8 Mapping Inner Space, Mapping Inner Space, Nancy Margulies with Nusa Maal, Corwin, 2001
- 9 The Myths of Innovation, The Myths of Innovation, Scott Berkun, O'Reilly Media, 2010
- 10 The art of Innovation, The art of Innovation, Tom Kelly with Jonathan Littman, profile, 2016
- 11 Creative Confidence: Unleashing the Creative Potential Within Us All, Creative Confidence: Unleashing the Creative Potential Within Us All, Tom Kelly and David Kelly, William Collins, 2013
- 12 A Whack on the side of the head, A Whack on the side of the head, Roger von Oech, Grand Central Publishing, 2008
- 13 A Kick in the seat of the pants, A Kick in the seat of the pants, Roger von Oech, William Morrow, 1986
- 14 They all laughed, They all laughed, Ira Flatow, Harper Perennial, 1993
- 15 Imagine, How creativity works, Imagine, How creativity works, Jonah Lehrer, Houghton Mifflin, 2012
- 16 101 Creative problem solving techniques, 101 Creative problem solving techniques, James m Higgins, New Management Publishing Company, 2006
- 17 Creative approach to problem solving, Creative approach to problem solving, Scott G Isaksen, K Brian Dorval, Donald J Treffinger, SAGE Publications, 2010
- 18 Creative problem solving An Introduction, Creative problem solving An Introduction, Donald J. Treffinger, ?Scott G. Isaksen, ?K. Brian Stead-Dorval, Prufrock Press, 2006

**References:**

- 19 Strategies for creative problem solving , Strategies for creative problem solving , H. Scott Fogler & Steven E. LeBlanc, Prentice Hall, 2008
- 20 Game storming, Game storming, Dave Gray, Sunni Brown and James Macanufo, O'Reilly Media, Incorporated, 2010
- 21 Creating minds, Creating minds, Howard Gardner, Basic Books, 2011
- 22 Creativity –Flow and Psychology of Discovery and Invention, Creativity –Flow and Psychology of Discovery and Invention, Mihaly Csikzentmihalyi, HarperCollins, 2009
- 23 Aha! Insight, Aha! Insight, Martin Gardner., Scientific American, Incorporated, 1978
- 24 The Ultimate Lateral & Critical Thinking Puzzle book, The Ultimate Lateral & Critical Thinking Puzzle book, Paul Sloane, Des MacHale & M. A. DiSpezio, Sterling, 2002
- 25 Test your Lateral Thinking IQ, Test your Lateral Thinking IQ, Paul Sloane, Sterling, 1994
- 26 Intriguing Lateral Thinking Puzzles, Intriguing Lateral Thinking Puzzles, Paul Sloane & Des MacHale, Sterling Publishing Company, 1996

**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