

SCHEME OF COURSE WORK (R-2022)

Course Details:

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|------------------------|--|----------------|--------------------|--|
| Course Title | Design Thinking and Innovation | | | |
| Course Code | : 22ME11D1 | L T P C | : 0 0 3 1.5 | |
| Program: | : B. Tech. | | | |
| Specialization: | : Mechanical Engineering (Robotics) | | | |
| Semester | : IV | | | |
| Faculty Name | : Dr Sanjay K Darvekar, Associate Professor | | | |
| Designation | | | | |

Course Outcomes (COs): At the end of the course, the student will be able to

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| CO-1 | Outline a problem, apply methods of Empathy on user groups (L2) |
| CO-2 | Describe and define the problem specific to the user group (L2) |
| CO-3 | Apply ideation tools to generate Ideas to solve the problem (L3) |
| CO-4 | Develop prototypes (L4) |
| CO-5 | Test the ideas and demonstrate Storytelling ability to present the Ideas (L4) |

Program Outcomes (POs): A graduate of mechanical engineering will be able to

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| PO-1 | Apply the knowledge of mathematics, science, engineering fundamentals to solve complex mechanical engineering problems including robotics applications. |
| PO-2 | Attain the capability to identify, formulate and analyze problems related to mechanical and robotics engineering. |
| PO-3 | Design solutions for mechanical and robotics system components and processes that meet the specified needs with appropriate consideration for public health and safety. |
| PO-4 | Perform analysis, conduct experiments and interpret data by using research methods such as design of experiments to synthesize the information and to provide valid conclusion. |
| PO-5 | Select and apply appropriate techniques and modern engineering software tools including prediction and modeling to complex mechanical and robotics systems. |
| PO-6 | Carry out their professional practice in mechanical engineering in particular robotics area by appropriately considering the issues related to society. |
| PO-7 | Understand the impact of the professional engineering solutions on environmental safety and legal issues. |
| PO-8 | Transform into responsible citizens by resorting to professional ethics and norms of the engineering practice. |

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| PO-9 | Function effectively in individual capacity as well as a member in diverse teams and in multidisciplinary streams. |
| PO-10 | Communicate fluently with the engineering community and society; prepare reports; and make presentations effectively. |
| PO-11 | Apply knowledge of the engineering and management principles to deal with projects and their finance in multidisciplinary environments. |
| PO-12 | Engage themselves in independent and life-long learning for continuing professional practice in their specialized areas of mechanical and robotics engineering. |

Course Outcome Vs Program Outcomes:

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO-1 | 3 | 2 | | | | S | | | | | | |
| CO-2 | 2 | 3 | | | | | | | | | | |
| CO-3 | 3 | | 2 | | | | | | | | | 2 |
| CO-4 | 3 | | 3 | | 2 | | | | | | | |
| CO-5 | 3 | | | 3 | | | | | | | | 2 |

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), Blank: No Correlation

Program Specific Objectives (PSOs):

The student must attain the knowledge and skills to

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| PSO-1 | Design, analyze and develop mechanical and robotic systems that are cost effective and environment friendly using advanced tools and techniques. |
| PSO-2 | Model, program and control safe and productive automation systems using various software tools and algorithms. |
| PSO-3 | Apply domain knowledge of mechanical and robotics to provide solutions in interdisciplinary areas to meet current industrial and societal challenges. |

Course Outcome Vs Program Specific Outcomes:

| COs | PSO1 | PSO2 | PSO3 |
|------|------|------|------|
| CO-1 | 3 | | |
| CO-2 | 3 | | |
| CO-3 | 3 | | |
| CO-4 | 3 | | |
| CO-5 | 3 | | |

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), Blank: No Correlation

Teaching-Learning and Evaluation

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| Assessment Methods: | Presentation, Demo |
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| Week | Contents | Course Outcomes | Sample Questions | Teaching/ Learning Strategy | Assessment Method & Schedule |
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| 1 | Identify an Opportunity and Scope of the Project | CO-1 | What is the domain area identified by your team? | Lecture, PPT, Group Discussion | Activity, Display (Week 1) |
| 2 | Explore the possibilities and Prepare design brief | CO-1 | Present the design brief | Lecture, PPT, Group Discussion | Presentation (Week 2) |
| 3 | Apply the methods of empathize and Define Phase | CO-2 | Develop Empathy map | Lecture, PPT, Group Discussion, Roll play | Presentation (Week 3) |
| 4 | Finalize the problem statement | CO-2 | Present your final how might we statement | Lecture, PPT, Group Discussion | Presentation (Week 4) |
| 5 | Apply the methods of Ideate Phase | CO-3 | Tools used for Ideate phase | Lecture, PPT, Group Discussion | Presentation (Week 5) |
| 6 | Generate lots of Ideas | CO-3 | Brain storming result | Lecture, PPT, Group Discussion | Presentation (Week 6) |
| 7 | Internal Exam - 1 | | | | |
| 8 | Apply the methods of Prototype Phase | CO-4 | Evaluate the ideas and select the best one | Lecture, PPT, Group Discussion | Presentation (Week 8) |
| 9 | Create prototypes of selected ideas | CO-4 | Apply your learning to develop a prototype | Lecture, PPT, Group Discussion | Presentation (Week 9) |
| 10 | Test the prototype and collect feedback | CO-4 | Present the feedback on test phase | Lecture, PPT, Group Discussion | Presentation (Week 10) |
| 11 | Iterate and improve the ideas | CO-5 | What is the importance of early failure? | Lecture, PPT, Group Discussion | Presentation (Week 11) |
| 12 | Present your solution through Storytelling method | CO-5 | Present the most effective solution | Lecture, PPT, Story Telling | Presentation (Week 12) |
| 13 | Fine tuning and submission of project report | CO-5 | Project Report | PPT | Presentation (Week 13) |

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| 14 | Internal Exam – 2 (Presentation and Demo of prototype) |
| 15 | External Exam (Presentation and Demo of prototype) |

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