

Programme Name	Masters of Technology in Mechanical Engineering with Specialization in CAD/CAM Robotics
Course Code	MECC5061S
Course Title	3D Printing

Course Outcomes

After completion of course, students would be able to

1. Understand and evaluate various existing Product Development processes
2. Develop new technologies in the field Rapid Prototyping Manufacturing
3. Generate innovative ideas to reduce time and cost by developing new methods and materials for the modern manufacturing industry.

Course Contents

Rapid Product Development

Product Developing Cycle, Definition of Rapid Product Development, Virtual prototypical and rapid manufacturing technologies, Physical Prototyping & rapid manufacturing technologies, Synergic integration technologies

Rapid Prototyping Processes

Principal of Rapid Prototyping, Various RP technologies, Selection of a suitable RP process for a given application, Status of outstanding issue in RP- accuracy, speed, materials (strength, homogeneity and isotropy), Emerging Trends

Rapid Tooling

Introduction to Rapid Tooling, Indirect Rapid Tooling Processes, Direct Rapid Tooling Processes, Emerging Trends in Rapid Tooling

Reverse Engineering

Data Extraction, Data Processing

Applications and Case Studies

Engineering Applications, Medical Applications

Processing of Polyhedral Data

Polyhedral BRep modeling, Introduction to STL format, Defects and repair of STL files, Overview of the algorithms required for RP&T and Reverse Engineering

Laboratory and Demonstration Sessions

Exercise using 3D CAD software, Preparation STL files processing, Making models on FDM RP machine, Demonstration of Silicon Rubber Molding and Application of post processing techniques on FDM parts.

Recommended Reading	
1.	Chua Chee Kai and Leong Kah Fai, Rapid Prototyping Principles and Applications in Manufacturing, John Wiley & Sons, 1997.
2.	K.P.Karunakaran,Rapid Product Development & Manufacturing, IIT, Bombay, 1st edition, 2013.
3.	Peter D. Hilton and Paul F. Jacobs (Editors.), Rapid Tooling Technologies and Industrial Applications, Marcel Dekker. 4th edition, 2000.
4.	Todd Grimm,User's Guide to Rapid Prototyping, Society of Manufacturing Engineers, 1st edition, 2004.
5.	Paul F. Jacobs,Stereo-lithography and Other RP&M Technologies from Rapid Prototyping to Rapid Tooling, SME/ASME, 1996.
6.	N. Hopkinson, R. J. M. Hague, and P.M. Dickens,Rapid Manufacturing , An Industrial Revolution for the digital age, John Wiley & Sons, Ltd, 2nd edition, 2006.
7.	Ken Pimentel, Kevin Teixeira,Virtual Reality, Windcrest/McGraw-Hill, 1st edition, 2003.
8.	Andreas Gebhardt,Rapid Prototyping, Hanser Publishers,2nd edition – 2003.
9.	RafiqNoorani, Rapid Prototyping Principles and Applications, John Wiley & Sons -1st edition, 2006.
10	Wasim Ahmed Khan, Abdul Raouf, Kai Cheng, Virtual Manufacturing, Springer, 2011