

Branch Name:	Mechanical Engineering (CAD/CAM)
Program Code:	ET201
Course Name:	Rapid Prototyping And Tooling
Course Code:	2ET2010205T
Pre-requisite Course:	Zeal to learn the subject

Course Objectives:

1. Generating a good understanding of RP history, its development and applications.
2. Expose the students to different types of Rapid prototyping processes, materials used in RP systems and reverse engineering.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction: Prototyping fundamentals, Historical development, Fundamentals of Rapid Prototyping, Advantages and Limitations of Rapid Prototyping, Commonly used Terms, Classification of RP process, Rapid Prototyping Process Chain and applications.	04	16
2	Methods for Rapid Tool Production: Process Technology, Basic concept & process detail of RP process like Stereo- lithography (SL), Solid foil polymerization, Selective laser sintering, Selective powder binding, Ballistic particle manufacturing both 2D and 3D, Fused Deposition Modelling, Shape Melting, Laminated Object Manufacturing, Solid Ground Curing, Repetitive Masking and deposition, Beam Inference Solidification, Holographic Interference Solidification.	07	28
3	CAD Modelling and Data Processing for RP: CAD model preparation, Data Requirements, Data formats (STL, SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP), Data interfacing, Part orientation and support generation, Support structure design, Model Slicing and contour data organization, direct and adaptive slicing, Tool path generation.	06	24
4	Rapid Tooling: Convectional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling methods, Soft and Hard Tooling methods.	04	16
5	Reverse Engineering: Basic concept, Digitization techniques, Model Reconstruction, Data Processing for Rapid Prototyping, Reverse Engineering (RE) Methodologies and Techniques, Selection of RE systems, RE software, RE hardware, RE in product development.	04	16

Review Presentation:

The student is expected to spend minimum 2 hours per week (as mentioned in the teaching and evaluation scheme) to refer at least two peer reviewed journal papers related to this domain/subject. The student is expected to identify issues/challenges and emerging trends in the domain/subject. Student is supposed to explore various video lectures (E.g. NPTEL) available in the domain/subject. Student is required to make a review-presentation on the work carried out for the same.

Recommended sites for journal papers are (1) asmedigitalcollection.asme.org (2) springer.com (3) sciencedirect.com (4) ieeexplore.ieee.org (5) scholar.google.co.in or others of similar repute.

List of Reference Books:

1. Paul F. Jacobs, Rapid prototyping & Manufacturing Fundamental of sterolithography, SME Publications
2. Amitabh Ghosh, Rapid Prototyping, East West Press Pvt. Ltd
3. Chua C. K., Leong K. F. and Lim C. S., Rapid Prototyping, Principles and Application, World scientific publishing Co. Pvt. Ltd., Singapore
4. Andreas gebhardt, Rapid prototyping, Hanser gardner publications, USA
5. Kenneth g. cooper, Rapid prototyping technology.
6. Noorani R, Rapid Prototyping: Principles and Applications in Manufacturing, John Wiley & Sons.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand and use techniques for processing of CAD models for rapid prototyping.	2 Understanding
CLO2	Analyze the role of rapid prototyping in product development cycle	4 Analyze
CLO3	Integrate design concepts with CAD or reverse engineering for geometry preparation for Rapid prototyping of part.	3 Applying
CLO4	Analyze the working of different rapid prototyping systems and recommend suitable process for a given material and application.	4 Analyze
CLO5	Explain the concept of rapid tooling.	2 Understanding
CLO6	Analyze the process chain of different rapid prototyping systems and create a pathway for rapid manufacturing.	5 Evaluating

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CLO1	M				M	L							M	
CLO2			M		M						L			L
CLO3				M		M			L				L	
CLO4				M	M					M				M
CLO5		M	M										M	
CLO6							M	L				L		M

H: High, M: Medium, L: Low