COURSE CONTENT

3D Printing LAB								
I Semester: M.Tech (CAD/CAM)								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
2214041	**Advanced**	0	0	4	2	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 36**				**Total Classes: 36**		
Prerequisites: Manufacturing Processes, Engineering Drawing, and CAD Modelling								

Course Overview:

3D Printing Lab course provides hands-on experience with 3D printing technologies, teaching students to design for AM, operate 3D Printing machines, select materials, and perform post-processing on parts. Key topics include principles of 3D Printing, design tools, different material types, build preparation, and part inspection, with applications in various sectors like aerospace, medical, and automotive.

Course Objectives:

1. To provide hands-on experience with additive manufacturing technologies.
2. To train students in CAD modeling and preparation of STL files for 3D printing.
3. To demonstrate operation and troubleshooting of 3D printers.
4. To develop skills in post-processing and inspection of printed components.
5. To expose students to material selection, process planning, and applications of additive manufacturing.

Course Outcomes: After Completion of the Course, Students should be able to

1. Prepare 3D CAD models and convert them into printable formats.
2. Operate and calibrate different types of additive manufacturing machines.
3. Select appropriate materials and parameters for specific applications.
4. Inspect and evaluate the quality of printed parts through dimensional and visual checks.
5. Understand practical challenges and applications of additive manufacturing in real-world scenarios.

LIST OF EXPERIMENTS:

1. Review of CAD Modeling Techniques and Introduction to RP
2. Forming Groups & Assigning Creative Idea
3. Generating STL files from the CAD Models & Working on STL files
4. Modeling Creative Designs in CAD Software
5. Assembling Creative Designs in CAD Software
6. Processing the CAD data in Catalyst software (Selection of Orientation, Supports generation, Slicing, Tool path generation)
7. Simulation in Catalyst Software
8. Sending the tool path data to FDM RP machine
9. Fabricating the physical part on FDM RP machine

10. Removing the supports & post processing (cleaning the surfaces)
11. Demonstrating Creative Working Models
12. Converting CT/MRI scan data into STL file using MIMICS software (Demo)

Note: Conduct any Ten exercises from the list given above.

TEXT BOOKS:

1. Rapid Prototyping: Principles and Applications, Chee Kai Chua, Kah Fai Leong and Chu Sing Lim, World Scientific Publishing Co, Third Edition, 2010.
2. Additive Manufacturing: Materials, Processes, Quantifications and Applications, Kun Zhou, CRC Press, 1st Edition, 2021.

REFERENCE BOOKS:

1. Rapid Manufacturing: The Technologies and Applications of Rapid Prototyping and Rapid Tooling, D. T. Pham and S. S. Dimov, Springer, 1 st Edition 2001.
2. Wohlers Report 2000: Rapid Prototyping and Tooling State of the Industry, Terry T. Wohlers, Wohlers Associates, Fort Collins, CO, Annual Report, 2000.
3. Rapid Prototyping and Engineering Applications, Frank W. Liou, CRC Press, 2 Edition, 2019.

ELECTRONIC RESOURCES:

1. https://3dp-dei.vlabs.ac.in/

MATERIALS ONLINE:

1. Course template
2. Open-ended experiments
3. Definitions and terminology