

IV B.TECH - I SEMESTER
ADDITIVE MANUFACTURING

Course Code: ME7T4A
Lecture: 3 periods/week
Tutorial: 1 period/week

Credits: 3
Internal assessment: 30 marks
Semester end examination: 70 marks

COURSE OBJECTIVES:

- To introduce students the basics of additive manufacturing/rapid prototyping and its applications in various fields, reverse engineering techniques.
- To familiarize students with different processes in rapid prototyping systems.
- To teach students about mechanical properties and geometric issues relating to specific rapid prototyping applications.

COURSE OUTCOMES:

Upon completion of this course the student will be able to:

1. Demonstrate the knowledge of Additive Manufacturing and Rapid Prototyping technologies.
2. Describe different RP techniques.
3. Discuss fundamentals of Reverse Engineering.

UNIT I

INTRODUCTION AND BASIC PRINCIPLES:

Definition , Generic Additive Manufacturing (AM) Process, Terms related to AM, Benefits of AM, Distinction between AM and CNC machining, Additive manufacturing process chain: Variation between different AM machines, Metal systems, Maintenance of Equipment, Material Handling Issues.

UNIT II

Introduction to rapid prototyping (RP), Need of RP in context of batch production, Basic principles of RP, Steps in RP, Process chain in RP in integrated CAD- CAM environment, Advantages of RP, Medical applications.

UNIT III

Classification of different RP techniques – based on raw materials, layering technique (2-D or 3-D) and energy sources: Process technology, Stereo-lithography (SL), photo polymerization, liquid thermal polymerization, Solid foil polymerization

UNIT IV

Selective laser sintering, Selective powder binding, ballistic particle manufacturing – both 2-D and 3-D, Fused deposition modeling, Shape melting, Laminated object manufacturing, Solid ground curing, 3 D printing

UNIT V

INTRODUCTION TO REVERSE ENGINEERING

Meaning, Use, RE-The generic process, Phase of RE–scanning, Contact Scanners, Noncontact Scanners, Point Processing, Application Geometric Model, Development.

Learning Resources

Text Books:

1. Ian Gibson, David W. Rosen, Brent Stucker , “Additive Manufacturing Technologies” ,Springer,2009
2. Chua C. K., Leong K. F., and Lim C. S., “Rapid Prototyping: Principles and Applications”, Second Edition, World Scientific Publishers (2003),.
3. Patri K. Venuvinod, Weiyin Ma “Rapid Prototyping: Laser-Based and Other Technologies” Springer , 2004

Reference Books :

1. Peter D. Hilton, Hilton/Jacobs, Paul F. Jacobs, “Rapid Tooling: Technologies and Industrial Applications”, CRC Press,2000.
2. Burns. M, “Automated fabrication”, Prentice-Hall,1993.