COURSE CONTENT

ADDITIVE MANUFACTURING PROCESSES

VII Semester: ME

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AMEC41	Elective	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes:45		

Prerequisite: Manufacturing Processes

I. COURSE OVERVIEW:

The primary objective of this course is to build bridges between the gap of an idea and production. Rapid prototyping is a group of methods used to rapidly manufacture a scale model of a physical part or assembly using three-dimensional computer aided design (CAD), Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) data. Construction of the part or assembly is usually done using 3D printing technology. Rapid prototyping techniques are often referred to solid free; computer automated manufacturing, form fabrication. This course covers the knowledge of rapid prototyping systems.

II. COURSE OBJECTIVES:

The students will try to learn:

I. The Importance of Additive manufacturing Technology in the day-to-day life, and study the basic 3D Printing processes and techniques used.
II. The knowledge in various materials and machines used for the development of prototypes.
III. The Design features that make each of these Additive manufacturing process both harder, easier, assess design and manufacturing features on real products.

III.COURSE SYLLABUS:

MODULE-I: INTRODUCTION TO RAPID PROTOTYPING (09)

Introduction: Prototype Fundamentals, Types and Roles of Prototype, Fundamentals of Rapid Prototyping, Phases of Development Leading to Rapid Prototyping, Advantages of Rapid Prototyping and Classifications of Rapid Prototyping System, Generic RP process. Rapid Product Development: An Overview virtual prototyping and testing technology.

MODULE-II: LIQUID-BASED RAPID PROTOTYPING SYSTEMS (09)

Liquid-Based Rapid Prototyping Systems: Principle, Process parameter, Process details, Advantages, Disadvantages and Applications of Stereolithography Apparatus (SLA), Solid Ground Curing (SGC), Solid Object Ultraviolet-Laser Printer (SOUP), Rapid Freeze Prototyping and Micro fabrication

MODULE-III: SOLID-BASED RAPID PROTOTYPING SYSTEMS (09)

Solid-Based Rapid Prototyping Systems: Principle, Process parameter, Process details, Advantages, Disadvantages and Applications of Laminated Object Manufacturing (LOM);
Fused Deposition Modeling (FDM), Paper Lamination Technology (PLT), Multi-Jet Modeling System (MJM) and CAM-LEM.

MODULE-IV: POWDER-BASED RAPID PROTOTYPING SYSTEMS (09)

Powder-Based Rapid Prototyping Systems: Principle, Process parameter, Process details, Advantages, Disadvantages and Applications of Selective Laser Sintering (SLS). Laser Engineered Net Shaping (LENS), Multiphase Jet Solidification (MJS) – Hands on Session.

MODULE-V: RAPID TOOLING (09)

Rapid Tooling: Introduction to rapid tooling (RT), Indirect rapid tooling methods: spray metal deposition, RTV epoxy tools, and 3D Keltool process, Direct rapid tooling methods: DTM Rapid Tool Process, EOS Direct Tool Process and Direct Metal Tooling using 3DP.

V.TEXT BOOKS:

1. Chua C K, Leong K F, Chu S L, "Rapid Prototyping: Principles and Applications in Manufacturing", World Scientific, 3rd Edition, 2008.
2. Liou W L, Liou F W, "Rapid Prototyping and Engineering applications: A Tool Box for Prototype Development", CRC Press, 1st Edition, 2007.

VI.REFERENCE BOOKS:

1. Gibson D W Rosen, Brent Stucker, "Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing", Springer, 1st Edition, 2014.
2. A. K. Kamrani, E.A. Nasr, "Rapid Prototyping: Theory and practice", Springer, 1st Edition, 2006.
3. Rafiq I. Noorani, "Rapid Prototyping: Principles and Applications", John Wiley & Sons, 1st Edition, 2005.

VII.WEB REFERENCES:

1.https://nptel.ac.in/courses/112102103/16
2.https://nptel.ac.in/courses/112107078/37

VIII.E-TEXT BOOKS:

https://www.cet.edu.in/noticefiles/258_Lecture%20Notes%20on%20RP-ilovepdf-compressed.pdf