MEC807:3D PRINTING

L:3 T:0 P:0 Credits:3

Course Outcomes: Through this course students should be able to

- develop the concept of reverse engineering methodology
- identify the current and emerging 3D printing applications in a variety of industries
- identify opportunities to apply 3D printing technology for time and cost savings

Unit I

Product Prototyping : Development of Successful Product, Product Prototyping and its Impact, Product Prototyping and Product Development, Product Prototyping, Product Prototyping and Management, Product and Prototype Cost Estimation, Prototyping Design Methods, Prototyping Design Tools, Learning from Nature

Unit II

Modeling and Virtual Prototyping : Mathematical Modeling, Modeling of Physical Systems, Product Modeling, Using Commercial Software for Virtual Prototyping, Virtual Reality and Virtual Prototyping

Unit III

Material Selections and Product Prototyping : Prototyping Materials, Modeling of Material Properties, Modeling and Design of Materials and Structures

Unit IV

Rapid Prototyping processes : Rapid Prototyping Overview, Rapid Prototyping Procedure, Liquid Based Rapid Prototyping Processes, Solid Based Rapid Prototyping Processes, Powder Based Rapid Prototyping Processes, Future Rapid Prototyping Processes

Unit V

Building a Prototype Using Off-the-Shelf Components : How to Decide What to Purchase, How to Find the Catalogs That Gave the Needed Components, How to Ensure That the Purchased Components Will Work Together, Tolerance Analysis, Tolerance Stack Analysis, Assembly Stacks, Process Capability, Statistical Tolerance Analysis, Case Study

Unit VI

Applications and Examples : Application-Material Relationship, Finishing Processes, Applications in Design, Applications in Engineering, Analysis and Planning, Applications in Manufacturing and Tooling, Aerospace Industry, Automotive Industry, Biomedical Industry, Jewelry Industry, Coin Industry, Tableware Industry

Text Books:

1. RAPID PROTOTYPING AND ENGINEERING APPLICATIONS by FRANK W LIOU, CRC PRESS

References:

1. REVERSE ENGINEERING AN INDUSTRIAL PERSPECTIVE by VINESH RAJA,? KIRAN J. FERNANDES, SPRINGER

2. RAPID PROTOTYPING: PRINCIPLES & APPLICATIONS IN MANUFACTURING by CHUA CHEE KAI,? LEONG KAH FAI, JOHN WILEY & SONS