PPD6J004|RAPID MANUFACTURING PROCESS

MODULE -I (12 hours)

INTRODUCTION: History - Development of RP systems - Applications in Product Development, Reverse Engineering, Rapid Tooling, Rapid Manufacturing- Principle - Fundamental - File formatOther translators - medical applications of RP - On demand manufacturing - Direct material deposition - Shape Deposition Manufacturing. LIQUID BASED AND SOLID BASED RAPID PROTOTYPING SYSTEMS: Classification - Liquid based system - Stereo lithography Apparatus (SLA), details of SL process, products, Advantages, Limitations, Applications and Uses. Solid based system- Fused Deposition Modeling, principle, process, products, advantages, applications and uses - Laminated Object Manufacturing

MODULE -II (08 hours)

POWDER BASED RAPID PROTOTYPING SYSTEMS: Selective Laser Sintering - principles of SLS process, principle of sinter bonding process, Laser sintering materials, products, advantages, limitations, applications and uses. Three Dimensional Printing - process, major applications, research and development. Direct shell production casting -key strengths, process, applications and uses, case studies, research and development. Laser Sintering System, e-manufacturing using Laser sintering, customized plastic parts, customized metal parts, e-manufacturing - Laser Engineered Net Shaping (LENS).

MODULE -III (10hours)

MATERIALS FOR RAPID PROTOTYPING SYSTEMS: Nature of material - type of material - polymers, metals, ceramics and composites liquid based materials, photo polymer development -solid based materials, powder based materials - case study.

REVERSEENGINEERING AND NEW TECHNOLOGIES :Introduction, measuring device- contact type and non-contact type, CAD model creation from point clouds-pre- processing, point clouds to surface model creation, medical data processing - types of medical imaging, software for making medical models, medical materials, other applications - Case study.

MODULE -IV (10hours)

Software for RP: STL files, Overview of Solid view, magics, mimics, magic communicator, etc. Internet based software, Collaboration tools, Rapid Manufacturing Process Optimization: factors influencing accuracy, data preparation errors, Part building errors, Error in finishing, influence of build orientation. Surface digitizing, surface generation from point cloud, surface modification- data transfer to solid models.

TEXT BOOKS

1. Rafiq I. Noorani, Rapid Prototyping - Principles and Applications, Wiley & Sons, 2006.
2. Chua C.K, Leong K.F and Lim C.S, Rapid Prototyping: Principles and Applications, second edition, World Scientific, 2003.

REFERENCES

1. N.HOPKINSON, R.J.M, HAUGE, P M, DICKENS, "Rapid Manufacturing - An Industrial revolution for the digital age", Wiley, 2006

2. IAN GIBSON, "Advanced Manufacturing Technology for Medical applications: Reverse Engineering, Software conversion and Rapid Prototyping", Wiley, 2006

3. Paul F.Jacobs, Rapid Prototyping and Manufacturing, "Fundamentals of Stereo lithography", McGraw Hill 1993.

4. D.T.Pham and S.S.Dimov, "Rapid Manufacturing", Springer Verlog 2001.

5. Rapid Prototyping: Principles and Applications in Manufacturing- C.C. Kai and L.K.Fai, World Scientific Co.

6. Rapid Prototyping & Manufacturing- Paul F. Jacobs, McGraw-Hill.