RAPID PROTOTYPING

Subject Code: 13ME2102

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Pre requisites: Basic principles of CAD/CAM

Course Educational Objectives:

1. To explore and experience a range of materials and processes using digital manufacturing techniques and CAD modelling software to build engineering objects.
2. To develop strategies for the integration of digital manufactured objects into the building of 3 dimensional forms.
3. To develop conceptual, perceptual, formal and aesthetic concerns as related to the rapid prototyping of engineering objects.

Course Outcomes:

The student will be able to

1. competently use tools to explore digital manufacturing techniques and CAD modelling software
2. produce a range of work which uses digital manufacturing techniques and CAD modelling software to explore professional and creative growth and refinement of work
3. emphasise on digital manufacturing and modelling techniques and processes
4. identify and apply specific occupational, health and safety measures when making works using digital manufacturing techniques and hand making processes

UNIT – I

Introduction: Need for time compression in product development, Product development – conceptual design – development – detail design – prototype – tooling. Classification of RP systems, Stereo lithography systems – Principle – process parameters – process details – machine details, Applications.

UNIT – II

Direct Metal Laser Sintering (DMLS) system – Principle – process parameters – process details – machine details, Applications. Fusion Deposition Modeling – Principle – process parameters – process details – machine details, Applications. Laminated Object Manufacturing – Principle – process parameters – process details – machine details, Applications.

UNIT -III

Solid Ground Curing – Principle – process parameters – process details – machine details, Applications. 3-Dimensional printers – Principle – process parameters – process details – machine details, Applications, and other concept modelers like thermo jet printers, Sander‘s model maker, JP system 5, Object Quadra system

UNIT – IV

Laser Engineering Net Shaping (LENS), Ballistic Particle Manufacturing (BPM) – Principle. Introduction to rapid tooling – direct and indirect method, software for RP – STL files, Magics, Mimics. Application of Rapid prototyping in Medical field.

UNIT- V

Introduction to Virtual prototyping- End to end prototyping-simulation-components of virtual prototyping- effects- economics of virtual prototyping.

TEXT BOOKS:

1. Chua C.K., Leong K.F. and Lim C.S., “*Rapid Prototyping: Principles and Applications*”, 3e, World scientific publications, 2010.
2. Paul F Jacobs, “*Rapid Prototyping and manufacturing–Fundamentals of streolithography*”, Society of Manufacturing Engineering Dearborn, USA 1992

REFERENCES:

1. Pham,D.T. and Dimov.S.S., “*Rapid manufacturing*” , Springer, London, 2001.
2. Joe Cecil, “*Virtual Enginering*” , Momentum Press, 2010.