RAPID PROTOTYPE TECHNOLOGIES

I SEMSTER: RAPID PROTOTYPE TECHNOLOGIES

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
BCCB08	Core	3	-	-	3	30	70	100
Contact Classes: 45	Tutorials Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The courses should enable the students to:

I. Describe product development, conceptual design and classify rapid prototyping systems; explain stereo lithography process and applications
II. Identify The process photopolymers, photo polymerization, layering technology, laser and laser scanning
III. Applying of measurement and scaling technique for prototype manufacturing.

COURSE OUTCOMES:

CO1 : Describe product development, conceptual design and classify rapid prototyping systems; explain stereo lithography process and applications.
CO2 : Identify The process photopolymers, photo polymerization, layering technology, laser and laser scanning.
CO3 : Applying of measurement and scaling technique for prototype manufacturing.
CO4 : Identify the Rapid Prototyping Data Formats
CO5 : Application for powder based rapid prototyping systems

COURSE LEARNING OUTCOMES(CLOs) :

1. Identify and understand of basic concepts of Rapid prototyping technologies
2. Understand and Apply concepts of Rapid prototyping
3. Classify the rapid prototyping systems
4. Understand the different Models and specifications
5. Understand the selection of manufacturing method
6. Identify the Layering Technology, Applications.
7. Understand the different models and specifications
8. Classify the Rapid Tooling systems
9. Understand the Powder Based Rapid Prototyping Systems
10. Identify the Rapid Prototyping Data Formats
11. Understand the Rapid Prototyping Software's
12. Identify the Newly Proposed Formats
13. Application for powder based rapid prototyping systems
14. Application in Design and Engineering
15. Design and Production of Medical Devices, Forensic Science and Anthropology

UNIT-I	INTRODUCTION TO RAPID PROTOTYPING	Classes: 09

Introduction: Prototyping fundamentals, Historical development, Fundamentals of Rapid Prototyping, Advantages and Limitations of Rapid Prototyping, Commonly used Terms, Classification of RP process, Rapid Prototyping Process Chain: Fundamental Automated Processes, Process Chain.

UNIT-II	TYPES OF PROTOTYPING SYSTEMS	Classes: 09

Liquid-based Rapid Prototyping Systems: Stereo lithography Apparatus (SLA): Models and specifications, process, working principle, photopolymers, photo polymerization, layering technology, laser and laser scanning, applications, advantages and disadvantages, case studies. solid ground curing (SGC): models and specifications, process, working principle, applications, advantages and disadvantages, case studies; solid-based Rapid Prototyping Systems: Laminated Object Manufacturing (LOM): Models and specifications, Process, working principle, Applications, Advantages and disadvantages, Case studies. Fused Deposition Modeling (FDM): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies.

UNIT-III	POWDER BASED RAPID PROTOTYPING SYSTEMS AND TOOLING	Classes: 09
Powder Based Rapid Prototyping Systems: Selective laser sintering (SLS): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Three dimensional Printing (3DP): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Rapid Tooling: Introduction to Rapid Tooling (RT), Conventional Tooling Vs. RT, Need for RT. Rapid Tooling Classification: Indirect Rapid Tooling Methods: Spray Metal Deposition, RTV Epoxy Tools, Ceramic tools, Investment Casting, Spin Casting, Die casting, Sand Casting, 3D Keltool process. Direct Rapid Tooling: Direct AIM, LOM Tools, DTM Rapid Tool Process, EOS Direct Tool Process and Direct Metal Tooling using 3DP.		
UNIT-IV	**RAPID PROTOTYPING DATA FORMAT**	**Classes: 09**
Rapid Prototyping Data Formats: STL Format, STL File Problems, Consequence of Building Valid and Invalid Tessellated Models, STL file Repairs: Generic Solution, Other Translators, Newly Proposed Formats. Rapid Prototyping Software's: Features of various RP software‟s like Magic‟s, Mimics, Solid View, View Expert, 3 D View, Velocity 2, Rhino, STL View 3 Data Expert and 3 D doctor.		
UNIT-V	**RAPID PROTOTYPING APPLICATIONS**	**Classes: 09**
RP Applications: Application, Material Relationship, Application in Design, Application in Engineering, Analysis and Planning, Aerospace Industry, Automotive Industry, Jewellery Industry, Coin Industry, GIS application, Arts and Architecture. RP Medical and Bioengineering Applications: Planning and simulation of complex surgery, Customized Implants & Prosthesis, Design and Production of Medical Devices, Forensic Science and Anthropology, Visualization of Biomolecules.		
Text Books:		
Chua C.K., Leong K.F, LIM C.S, "Rapid prototyping: Principles and Applications", World Scientific publication Edition, 2010.		
Reference Books:		
1. D.T Pham, S. S. Dony, "Rapid Manufacturing", Springer, 1st Edition, 2001. 2. Paul F Jacobs, "Rapid Prototyping & Manufacturing", Wohlers Associates, ASME Press, 1st Edition, 1996.		