GUJARAT TECHNOLOGICAL UNIVERSITY

Syllabus for Bachelor of Vocation (B.Voc), 6th Semester
Branch: Production Technology
Subject Name: Rapid Prototyping and Reverse Engineering
Subject Code: 1160301

With effective from academic year 2018-19

Type of course: Engineering Science

Prerequisite: Zeal to learn the subject

Rationale: The course addresses the fundamentals of methods and techniques to support engineering design processes, by focusing on the opportunities provided by Reverse Engineering and Rapid Prototyping.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	50	0	0	0	50

Sr. No.	Topic	No. of Hours	Weightage %
01	**Introduction:** Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Need for time compression in product development, Usage of RP parts, Generic RP process, Distinction between RP and CNC, other related technologies, Classification of RP.	5	15
02	**CAD Modelling and Data Processing for RP:** CAD model preparation, Data Requirements, different types of Data formats, Data interfacing, Part orientation and support generation, Support structure design, Model Slicing and contour data organization, direct and adaptive slicing, Tool path generation.	6	15
03	**RP Systems:** Photo-polymerization process, Powder Bed Fusion process, Applications of Powder Bed Fusion Processes. Extrusion - Based RP Systems, 3D Printing process modelling, Applications of Printing Processes. Sheet Lamination process /Laminated Object Manufacturing (LOM), Beam Deposition: Laser Engineered Net Shaping (LENS), Direct Metal Deposition (DMD), Processing - structure- properties, relationships, Benefits and drawbacks.	10	35
04	**Rapid Tooling** Conventional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling Methods, Soft and Hard Tooling methods.	5	20
05	**RP Applications** Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP	6	15

Distribution of marks weightage for cognitive level:

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**20**	**20**	**-**	**-**	**-**

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Chua C K, Leong K F, Chu S L, Rapid Prototyping: Principles and Applications in Manufacturing, World Scientific.
2. Gibson D W Rosen, Brent Stucker., Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Springer.
3. Rapid Prototyping: Principles and Applications in Manufacturing by Noorani R, John Wiley & Sons.
4. Hilton P, Jacobs P F, Rapid Tooling: Technologies and Industrial Applications, CRC press.
5. Liou W L, Liou F W, Rapid Prototyping and Engineering applications: A tool box for prototype development, CRC Press.
6. Kamrani A K, Nasr E A, Rapid Prototyping: Theory and practice, Springer

Course Outcome:

Sr. No.	CO statement	Marks % weightage
CO 1	To understand the basic concepts of rapid prototyping	15
CO 2	Understand and use techniques for processing of CAD models for rapid prototyping	15
CO 3	Understand and apply fundamentals of rapid prototyping techniques	35
CO 4	Use appropriate tooling for rapid prototyping process	20
CO 5	Use rapid prototyping techniques for reverse engineering	15

List of Open Source Software/learning website:
https://nptel.ac.in,