GUJARAT TECHNOLOGICAL UNIVERSITY

Minor Degree – 3 D Printing
Subject Code: 114AN01
Semester – IV
Subject Name: Introduction to Additive Manufacturing

Prerequisite: None

Rationale: This course aims to familiarize students with basic terminologies of the 3 D printing (Additive Manufacturing) and essential knowledge required to get started in Additive manufacturing.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	100
3	0	2	4	70	0	30	0	

Content:

Sr. No.	Content	Total Hrs.
1	**Introduction** Definition, classification, Stages of additive manufacturing process, advantages limitations, applications, process selection, evaluation, benchmarking, future growth and opportunities.	09
2	**Liquid Based Processes** Principle and working of Stereolithography Apparatus (SLA), PolyJet 3D Printing, Multijet Printing, Solid Object Ultraviolet-laser Printer(SOUP),Rapid Freeze Prototyping, Process Parameters, Challenges, Materials and Applications.	12
3	**Powder Based Processes** Principle and working of Selective Laser Sintering(SLS), Laser EngineedNet Shaping(LENS), Electron Beam Melting(EBM),Colourjet Printing(CJP), Process Parameters, Challenges, Materials and Applications.	12
4	**Solid Based Processes** Basic principle and working of Fused Deposition Modeling process(FDM),Selective Deposition Lamination(SDL), Laminated Object Manufacturing (LOM), Ultrasonic consolidation, Process Parameters, Challenges, Materials and Applications.	12

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
25	25	25	25	--	---

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

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Reference Books/Material:

1. C. K. Chua, K. F. Leong, C. S. Lim, Rapid Prototyping – Principles and Applications, World Scientific publishing Co. Pte Ltd, 3rd Edition, 2010.

3. R. Noorani, 3D Printing Technology, Applications and Selection, CRC Press, 2017.

4. Additive Manufacturing Technologies and Applications, Special Issue Editors Salvatore Brischetto Paolo Maggiore Carlo Giovanni Ferro, MDPI

Course Outcomes:

At the end of the course, student should be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Understand principles of additive manufacturing	20
CO-2	Select additive manufacturing process for a given material and application.	30
CO-3	Analyze the additive manufacturing process for defect identification	30
CO-4	Design the selective process of additive manufacturing	20

Laboratory/Practical Work:

Exercise on 1) Stereolithography Apparatus (SLA)

2) Fused deposition modeling (FDM)

3) Selective Laser Sintering (SLS)