Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

M.E DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025

Second Semester

Product Design and Development

CM4152 / PPDT2423 - Solid Freeform Manufacturing

Regulations -2021/2024

Duration : 3 Hrs ***Maximum : 100 Marks***

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	How is Additive Manufacturing (AM) different from traditional manufacturing?	L2	1	2
2.	How does Food 3D Printing work?	L1	1	2
3.	Why is AM beneficial for lightweight structures?	L1	2	2
4.	Why is overhang angle important in AM design?	L1	2	2
5.	List the type of material is used in Stereolithography Apparatus (SLA).	L1	3	2
6.	What is Laminated Object Manufacturing (LOM)?	L2	3	2
7.	Infer primary energy source used in FDM.	L2	4	2
8.	Show the materials are commonly used in EBM.	L2	4	2
9.	How does MJM differ from FDM?	L2	5	2
10.	How is the metal powder delivered in LENS?	L1	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	Explain the additive manufacturing process chain, detailing each stage involved in producing an object from design to post-processing, and discuss the significance of each stage in the final product's quality, cost, and functionality.	L2	1	16
		Or			
	b	Discuss a case study of 3D printing in the electronics industry, detailing how the technology has been applied, the benefits it offers, the challenges faced, and the impact on the industry. Provide an in-depth analysis of a specific example where 3D printing has been used to manufacture electronic components or devices.	L2	1	16
12.	a	Explain how Design for Additive Manufacturing (DFAM) can be applied to improve part quality in additive manufacturing. Discover the principles of DFAM, how it contributes to enhanced part performance, and provide examples of how it helps resolve common challenges such as material waste, structural integrity, and design limitations in traditional manufacturing.	L4	2	16

			Or			
	b		Explain the concept of model slicing in additive manufacturing and its importance in tool path generation. Examine how slicing algorithms work, the different types of slicing strategies, and how they contribute to improving the efficiency, quality, and accuracy of 3D printed parts. Additionally, explain how tool path generation impacts the final product and how it affects factors like print time, material usage, and part strength.	L4	2	16
13.	a		Explain the principles of the Stereolithography Apparatus (SLA) in additive manufacturing with neat sketch and also mention its application, advantages and disadvantages.	L2	3	16
			Or			
	b		Explain the principles of Laminated Object Manufacturing (LOM) in additive manufacturing with neat diagram and also mention its application, advantages and disadvantages.	L2	3	16
14.	a		Explain the working principles of Fused Deposition Modeling (FDM) with neat diagram and also mention its application, advantages and disadvantages.	L2	4	16
			Or			
	b		Explain the principles of Electron Beam Melting (EBM) in additive manufacturing with neat diagram and also mention its application, advantages and disadvantages.	L2	4	16
15.	a	i	Discuss how the 3DP process works, the key components involved, and the materials commonly used in 3DP.	L2	5	10
		ii	Explain the principles of the Drop-on-Demand (DOD) mode in additive manufacturing with neat diagram.	L2	5	6
			Or			
	b	i	Explain the principles of Material Jetting, specifically focusing on the Multi Jet Modeling (MJM) technique with neat diagram.	L2	5	8
		ii	Explain the principles of Laser Engineered Net Shaping (LENS) in additive manufacturing with neat diagram.	L2	5	8