Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

M.E DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025

Second Semester

Product Design and Development

PPDT2423 - Solid Freeform Manufacturing

Regulations - 2024

Duration : 3 Hrs *Maximum : 100 Marks*

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

Q.No.	*Questions*	*BLT*	*CO*	*Marks*
1.	Define solid freeform manufacturing.	L1	1	2
2.	Write about electronics printing.	L1	1	2
3.	Interpret topology optimization.	L2	2	2
4.	Infer importance of reverse engineering.	L2	2	2
5.	Interpret the role of process planning in SLA.	L2	3	2
6.	Mention four applications of LOM.	L1	3	2
7.	Recall the process variables of Fused Deposition Modeling process.	L1	4	2
8.	Distinguish between SLS and SLM.	L2	4	2
9.	Classify types of binder jetting.	L2	5	2
10.	Identify four real-time applications of LENS.	L2	5	2

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

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	Describe the following in detail with respect to solid free form manufacturing: i. Data formats and Part orientation ii. Support generation iii. Model slicing iv. Tool path generation	L2	1	16
		Or			
	b	Elaborate the process methods, advantages and disadvantages of powder-based RP system compared with a) Solid based SP system b) Liquid-based RP system.	L2	1	16
12.	a	Summarize the CAD modeling, model reconstruction and data processing for AM.	L2	2	16
		Or			
	b	Compare the design requirements of additive manufacturing for part production, mass production and series production.	L2	2	16

13.	a	Compare and contrast SLA and DLP on materials, processing, advantages, limitations and applications with suitable sketches.	L2	3	16
		Or			
	b	Outline the working principle, process parameters, advantages and limitations of UAM with a suitable schematic diagram.	L2	3	16
14.	a	An orthopedic device manufacturer aimed to enhance its product offerings by developing customized polyamide orthopedic implants focusing on creating lightweight, patient-specific implants with intricate geometries that would optimize functionality and improve patient outcomes. Recommend a suitable technique, and elaborate the working principle, advantages, limitations and applications of process with required sketch.	L3	4	16
		Or			
	b	A luxury car manufacturer is developing a new high-performance sports car that demands lightweight, high-strength engine components to improve acceleration, fuel efficiency, and overall vehicle performance. Traditional methods like machining and casting are not suitable for producing these parts. Asses the scenario, suggest them a suitable AM technique that has unique processing conditions like vacuum environment and high-processing temperature than SLM for intricate geometries, and explain the design phase, machine preparation, printing parameters of the process with their advantages and limitations.	L3	4	16
15.	a	A medical research institution is working on developing customized scaffolds for bone tissue regeneration. These scaffolds need to be biocompatible, with a porous structure that mimics the natural bone environment, allowing for cell growth and nutrient diffusion. Predict a suitable AM technique for this application, elaborate on principle, process, physics of the process with appropriate schematics.	L3	5	16
		Or			
	b	A jewelry brand is exploring innovative ways to create customized, intricate jewelry pieces that combine precious metals, gemstone-like resins, and delicate patterns, while integrating different textures and materials, all within a single production process. Assess the scenario, suggest a suitable multi-material AM technique and illustrate the working strategy with their advantages, limitations.	L3	5	16