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Question Paper Code	13636
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B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Sixth Semester

Mechanical and Automation Engineering

20MUPC601 - ADDITIVE MANUFACTURING

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

	Marks	K – Level	CO
1. What is the main objective of Additive Manufacturing (AM)? (a) Material removal (b) Material joining (c) Material addition (d) Material hardening	1	K1	CO1
2. What is a future direction for AM? (a) Manual Production (b) Mass Customization (c) Bulk Smelting (d) Mining Operations	1	K1	CO1
3. Define Topology Optimization. (a) Cutting out material unnecessarily (b) Structuring parts for better performance (c) Painting parts for beauty (d) Welding parts randomly	1	K1	CO2
4. Why is part orientation critical? (a) To save CAD file size (b) To slow the build process (c) To increase energy use (d) To reduce material waste and improve quality	1	K1	CO2
5. What is the key material in SLA? (a) Powder (b) Metal (c) Liquid Photopolymer (d) Plastic filament	1	K1	CO3
6. Which system extrudes thermoplastic material? (a) SLA (b) DLP (c) FDM (d) SLM	1	K1	CO3
7. Define Selective Laser Sintering (SLS). (a) Partial melting of powder using a laser (b) Fusing sheets with glue (c) Heating filament directly (d) Painting powder	1	K1	CO4
8. Identify the function of the laser in LENS. (a) To cool powder (b) To deposit metal drops (c) To melt powder for solidification (d) To remove waste	1	K1	CO4
9. Which technology uses tiny jets to build parts? (a) Binder Jetting (b) Material Jetting (c) SLA (d) FDM	1	K1	CO5
10. Which technology is based on adhesive or thermal bonding? (a) SLM (b) Binder Jetting (c) Sheet Lamination (d) DLP	1	K1	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11. Define rapid prototyping in additive manufacturing.	2	K1	CO1
12. List the benefits of additive manufacturing over traditional manufacturing.	2	K1	CO1
13. Identify the business opportunities in additive manufacturing.	2	K1	CO1
14. List the steps involved in CAD model preparation for additive manufacturing.	2	K1	CO2
15. Compare uniform flat layer slicing and adaptive slicing.	2	K2	CO2
16. Outline the objectives of design for additive manufacturing (DFAM).	2	K2	CO2
17. Define photopolymerization.	2	K1	CO3
18. Infer the limitations of the FDM process.	2	K2	CO3
19. List the materials used in selective laser sintering (SLS).	2	K1	CO4
20. Classify the additive manufacturing processes based on the energy source used.	2	K2	CO4
21. Identify the advantages of multijet modeling.	2	K1	CO5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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22. Explain the gluing mechanism used in LOM. 2 K2 CO5

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23. a) Compare the advantages and limitations of rapid prototyping and rapid manufacturing. 11 K2 CO1

OR

b) Outline the future directions and trends in additive manufacturing. 11 K2 CO1

24. a) Show the unique capabilities of additive manufacturing (AM) that influence design strategies. 11 K2 CO2

OR

b) Infer the impact of part orientation and support structure generation on final build quality. 11 K2 CO2

25. a) Illustrate the working principle of stereolithography (SLA) and discuss how layer-by-layer curing contributes to the overall resolution. 11 K2 CO3

OR

b) Outline the part-building and post-processing steps involved in fused deposition modeling (FDM). 11 K2 CO3

26. a) Develop a block diagram for the selective laser sintering (SLS) process. 11 K3 CO4

OR

b) Identify the working principle of laser engineered net shaping (LENS) process. 11 K3 CO4

27. a) Identify the principle and process of three-dimensional printing (3DP) with a neat sketch. Also, list its merits and demerits. 11 K3 CO5

OR

b) Develop the entire process of laminated object manufacturing (LOM). 11 K3 CO5

28. a) (i) Explain the advantages and applications of the electron beam melting (EBM) process. 6 K2 CO4

(ii) Illustrate the steps involved in multijet modeling. 5 K2 CO5

OR

b) (i) Outline the process parameters involved in the Digital laser process. 6 K2 CO4

(ii) Explain the bonding mechanisms used in sheet lamination processes. 5 K2 CO5