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**Question Paper Code : 20710**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023

Fifth Semester

Mechanical Engineering

CME 339 – ADDITIVE MANUFACTURING

(Common to : Aeronautical Engineering / Aerospace Engineering / Automobile Engineering / Industrial Engineering / Industrial Engineering and Management / Materials Science and Engineering / Mechanical and Automation Engineering / Mechatronics Engineering / Production Engineering and Robotics and Automation)

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the difference between 3D printing and additive manufacturing?
2. Define Rapid Tooling.
3. List out the steps involved in the design for additive manufacturing.
4. What is tool path generation in additive manufacturing?
5. Define vat polymerization.
6. Mention the difference between CLIP and DLP.
7. What is the basic principle of stereolithography?
8. List out the materials used in laser-engineered net shaping.
9. Mention the types of material used in Material Jetting.
10. List out the types of Binder Jetting.

PART B — (5 × 13 = 65 marks)

11. (a) Express in detail about direct RP tooling, under what circumstances are these approaches adopted. (13)
- Or
- (b) Discuss about the potential of AM in Food and bio-printing applications. Give suitable examples to substantiate. (13)

12. (a) Explain the need for "Surface Tessellation Language", and also express the concept involved in STL file. (13)

Or

- (b) Explain the design rules followed for extrusion-based Additive Manufacturing. (13)

13. (a) Describe the Top-down and Bottom-up approach in Stereolithography Apparatus. Mention the advantages and limitations of SLA. (13)

Or

- (b) Explain LENS in additive manufacturing and identify its uniqueness over other processes like SLA. (13)

14. (a) Explain with a neat sketch the working principle of the Selective Laser Sintering process. (13)

Or

- (b) Sketch and explain the working principle, application and limitations of the "Fused Deposition Modelling" process. (13)

15. (a) Describe the steps involved in the Binder Jetting Process with real-time examples. (13)

Or

- (b) Explain with a neat sketch the working principle of the LOM process. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Justify the importance of additive manufacturing in modern days and the impact of AM in manufacturing sectors.

Or

- (b) Summarize the statement "Rapid prototyping uses the effective use of material, production ease of manufacturing and tooling".