Question Paper Code : **53295**

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Eighth Semester

Mechanical Engineering

ME 6018 — ADDITIVE MANUFACTURING

(Regulation 2013)

(Also Common to : PTME 6018 – Additive Manufacturing for
B.E. (Part-Time) – Sixth Semester – Mechanical Engineering – Regulation 2014)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define additive manufacturing.

2. List some of the disadvantages of rapid prototyping.

3. What is an STL file? How is it sliced?

4. Why is reverse engineering needed?

5. How layer by layer adhesion takes place in stereo lithography?

6. What is laminated object manufacturing?

7. What is LENS in additive manufacturing?

8. What is electron beam melting and state its applications?

9. List the process chain development in medical application of additive manufacturing.

10. List the developments in medical additive manufacturing.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Describe the various stages involved in design process of rapid prototyping. (7)

    (ii) Describe the use of rapid prototyping in product development. (6)

Or

    (b) (i) What are the differences between rapid tooling and conventional tooling? (10)

    (ii) How are rapid prototyping processes different from the conventional machining or forming processes? (3)

12. (a) Describe the data flow in basic rapid prototyping process. (13)

Or

    (b) Describe the steps involved in reverse engineering. (13)

13. (a) Explain the principle and working of stereo lithography process with neat sketch and state its advantages and applications. (13)

Or

    (b) With neat sketch explain the principle of fused deposition modeling process and state its advantages and applications. (13)

14. (a) Explain with neat sketch, the principle and working of selective laser sintering process. Also, state its merits and applications. (13)

Or

    (b) Enumerate the basic process capabilities, working principle, advantages and applications of three dimensional printing. (13)

15. (a) Describe bio-additive manufacturing process. (13)

Or

    (b) Describe computer aided tissue engineering for modeling and design of novel tissue scaffolds. (13)

PART C — (1 × 15 = 15 marks)

16. (a) A prototype of a tube with a square cross-section is to be fabricated using stereo-lithography. The outside dimension of the square = 100 mm and the inside dimension = 90 mm (wall thickness 5 mm except at corners). The height of the tube (z-direction) = 80 mm. Layer thickness = 0.10 mm. The diameter of the laser beam ("spot size") = 0.25 mm, and the beam is moved across the surface of the photopolymer at a velocity of 500 mm/s. Compute an estimate for the time required to build the part, if 10 s are lost each layer to lower the height of the platform that holds the part. Neglect the time for post curing.

Or

    (b) Compare stereo lithography, fused deposition modeling and selective laser sintering processes (in a table form) with respect build tray size, speed, accuracy, strength, weakness, build material and typical applications.