

B.E. PRODUCTION ENGINEERING FOURTH YEAR SECOND SEMESTER EXAMINATION, 2025

ADDITIVE MANUFACTURING (HONS.)

Time: Three Hours

Full Marks:100

Answer any FIVE questions

1. a) What do you mean by Additive Manufacturing? Classify Additive Manufacturing techniques depending on the fabrication technology.
b) Discuss on process chain of Additive Manufacturing.
c) What are the advantages and limitation of Additive Manufacturing?

(8+6+6)

2. a) Discuss on Stereo Lithography Apparatus (SLA) process with sketch.
b) SLA process is applied to make a hollow cylindrical object of inner diameter 50 mm, wall thickness 5mm and height 60 mm. The process uses laser beam which moves across the surface of liquid resin at a velocity of 500 mm/s. Thickness of each layer formed by the process is 0.20 mm. The time required to build the part is 1 hour. Assume 8 seconds are lost after each layer to lower the platform. Determine the required spot size of the laser beam.

(10+10)

3. a) Discuss on Fused Deposition Modeling (FDM) process with sketch highlighting the applications of it.
b) In fused deposition modeling setup the extruder head diameter is 1.50 mm and it produces layers that are of 0.25 mm thick. The extruder head and polymer extrudate velocities are both 50 mm/s. There is a delay of 8 seconds between layers as the extruder head is moved over a wire brush for cleaning. Calculate the production time for the generation of a solid cube of dimension of 50mm.

(10+10)

4. Discuss on the working principle of the following AM process with sketch highlighting the applications of it.
a) Selective Laser Melting (SLM)
b) Wire Arc Additive Manufacturing (WAAM)

10+10)

[Turn over

5. Discuss on the working principle of the following AM process with sketch highlighting the applications of it.

- a) Solid Ground Curing (SGC)
- b) 3D Printing Technology

(10+10)

6. Describe the working principle of the following AM process with sketch highlighting the advantages and drawbacks of it.

- a) Electron Beam Melting (EBM)
- b) Laminated Object Manufacturing (LOM)

(10+10)

7. a) What is Rapid Tooling? Distinguish between Direct Rapid Tooling and Indirect Rapid Tooling? How is the concept of Rapid Tooling applied in Investment Casting?
- b) Discuss on Selective Laser Sintering (SLS) method with sketch for development of Rapid Tool.

(12+8)

8. a) What is Reverse Engineering? Explain the various techniques of Reverse Engineering.
- b) Classify various types of models in different stages of integrated product development.
- c) Discuss on the concept of Concurrent Engineering for reducing the time to market of product.

(8+6+6)
