Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

End Term (Even) Semester Examination May-June 2025

Roll no.....

Name of the Program and semester: B. Tech ME IV Sem
Name of the Course: Additive Manufacturing
Course Code: TME 411

Time: 3 hour | Maximum Marks: 100

Note:

(i) All the questions are compulsory.
(ii) Answer any two sub questions from a, b and c in each main question.
(iii) Total marks for each question is 20 (twenty).
(iv) Each sub-question carries 10 marks.

Q1. (2X10=20 Marks)

a. Describe the role of powder characteristics (such as particle size and flowability) in the performance of sintering and melting-based AM processes. [CO1]
b. How has 3D printing contributed to the concept of distributed manufacturing and on-demand production? [CO2]
c. What are some notable applications of 3D printing in fields such as healthcare, aerospace, and automotive industries? Support your answer with suitable examples. [CO2]

Q2. (2X10=20 Marks)

a. Compare and contrast STL, OBJ, and STEP file formats in terms of their suitability for rapid prototyping. [CO3]
b. What are the advantages and limitations of using STL files for 3D printing? [CO3]
c. What are the key challenges and applications of micro- and nano-additive manufacturing technologies? [CO4]

Q3. (2X10=20 Marks)

a. How does reverse engineering support the additive manufacturing workflow, especially in legacy part reproduction? [CO4]
b. What are the common types of defects in AM processes, and how can in-situ monitoring techniques help in their detection and control? [CO5]
c. Discuss how additive manufacturing can be integrated into traditional manufacturing workflows to improve efficiency and customization. [CO5]

Q4. (2X10=20 Marks)

a. Differentiate between rapid prototyping and rapid tooling in AM. Provide examples of each and their typical use cases. [CO3]
b. What are the key criteria to consider when selecting an additive manufacturing (AM) technology for a specific application? [CO3]
c. Discuss the role of build orientation and layer thickness in optimizing AM process planning. [CO4]

Q5. (2X10=20 Marks)

a. How do material type and part geometry influence the selection of AM technologies? [CO3]
b. Explain how buoyancy-driven flow occurs in a melt pool and its impact on part microstructure. [CO4]
c. Describe a case study where simulation of temperature and fluid flow was critical in optimizing process parameters in additive manufacturing. [CO6]

Graphic Era
HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act. 1956

End Term (Even) Semester Examination May-June 2025

Note For the question paper setters:

- Question paper should cover all the COs of the course.
- Please specify COs against each question.