Printed Page:- 04 **Subject Code**:- **AME0612**

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VI - THEORY EXAMINATION (2023 - 2024)

Subject: Rapid Prototyping and Manufacturing

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION A **20**

1. Attempt all parts:-

1-a. What is the purpose of a slicer in 3D printing? (CO1) 1

(a) To convert a 3D model into machine code

(b) To control the temperature of the printer

(c) To provide support structures for the part

(d) To improve the surface finish of the part

1-b. Which of the following is a benefit of fused filament fabrication (FFF)? (CO1) 1

(a) High accuracy

(b) Low cost

(c) Large build volume

(d) All of the above

1-c. Which of the following is a disadvantage of using SGC for rapid prototyping? (CO2) 1

(a) High accuracy

(b) Limited build size

(c) Low resolution

(d) Slow printing speed

1-d. What is the primary advantage of PolyJET 3D printing? (CO2) 1

(a) High printing speed

(b) High accuracy and resolution

(c) Low cost of materials

(d) Ability to print with multiple materials simultaneously

1-e. Which of the following factors affects the resolution of a PolyJET 3D printer? (CO3) 1

(a) Size of the print bed

(b) Number of print heads

(c) Type of material used

(d) All of the above

1-f. Which of the following materials are commonly used in Ultrasonic Consolidation (UC) 3D printing? (CO3) 1

(a) Metals and alloys

(b) Plastics and polymers

(c) Ceramics and composites

(d) All of the above

1-g. What is the main advantage of using Inkjet Fusion for creating ceramic parts? (CO4) 1

(a) It produces parts with high strength and density

(b) It allows for the production of complex geometries

(c) It can produce parts in a variety of ceramics

(d) None of the above

1-h. What is the main disadvantage of using Binder Jetting for creating metal parts? (CO4) 1

(a) The parts are not as strong as those produced by other methods

(b) The process can be time-consuming and expensive

(c) The parts have a rough surface finish

(d) None of the above

1-i. What is the primary benefit of using batch production in manufacturing? (CO5) 1

(a) It allows for more efficient use of resources

(b) It reduces the cost of production

(c) It enables the production of products on-demand

(d) All of the above

1-j. What is the primary benefit of using hybrid manufacturing processes in batch production? (CO5) 1

(a) It allows for the production of parts with a range of materials and properties

(b) It reduces the amount of material waste

(c) It enables on-demand production of parts

(d) All of the above

2. Attempt all parts:-

2.a. What is revere engineering? (CO1) 2

2.b. What does SLA stand for in the context of rapid prototyping/3D printing? (CO2) 2

2.c. What are the disadvantages of LOM? (CO3) 2

2.d. How does Binder Jetting work? (CO4) 2

2.e. What are the benefits of using thermoforming in production? (CO5) 2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a. What is a STL file and how is it used in rapid prototyping? (CO1) 6

3-b. What are the key considerations when selecting a post processing technique? (CO1) 6

3-c. What are some of the industrial applications of SLA technology? (CO2) 6

3-d. What is the impact of PolyJet technology on the different industries? (CO2) 6

3.e. What is Fused Deposition Modeling (FDM)? What is the working principle of Fused Deposition Modeling? (CO3) 6

3.f. What design considerations need to be made when using Binder Jetting, and how do these considerations differ from traditional manufacturing methods? (CO4) 6

3.g. Discuss various biomedical applications of 3D printing? (CO5) 6

SECTION C **50**

4. Answer any <u>one</u> of the following:-

4-a. How has 3D printing impacted the manufacturing industry, and what are some of its advantages? (CO1) 10

4-b.	What are some of the security and privacy considerations involved in transmitting 3D printing data, and how can they be addressed? (CO1)	10

5. Answer any <u>one</u> of the following:-

5-a.	How has SGC technology evolved over the years? What is the future of SGC technology in the 3D printing industry? (CO2)	10
5-b.	How do you determine the optimal orientation and placement of a part within the liquid-based rapid prototyping build volume, and what factors should be considered when making these decisions? (CO2)	10

6. Answer any <u>one</u> of the following:-

6-a.	Explain how solid-based rapid prototyping can be used to create functional prototypes for testing and validation before production. (CO3)	10
6-b.	Discuss the potential impact of solid-based rapid prototyping on the manufacturing industry, including changes to traditional manufacturing processes and supply chains. (CO3)	10

7. Answer any <u>one</u> of the following:-

7-a.	Explain the role of laser power and scanning speed in SLS and how they can be optimized to achieve the desired part quality & accuracy. (CO4)	10
7-b.	Describe the steps involved in Inkjet fusion process? how the process parameters such as jetting speed, drop size and temperature affect the quality of the final parts. (CO4)	10

8. Answer any <u>one</u> of the following:-

8-a.	How does pre processing impact the final product quality? How does pre processing impact the time to market for new products? (CO5)	10
8-b.	What are the different applications of rapid prototyping in the fashion industry? (CO5)	10