Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2021

Subject Code:3171926 Date:31/12/2021

Subject Name:Rapid Prototyping

Time:10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What is the difference between additive and subtractive manufacturing? Enlist the advantages of additive manufacturing over subtractive manufacturing.	**03**
	(b)	Explain the importance of .STL file format in 3D printing.	**04**
	(c)	Explain the generic additive manufacturing process with neat sketch.	**07**
Q.2	**(a)**	Explain the importance of RP in product development process.	**03**
	(b)	Explain the importance of part orientation in 3D printing with suitable example.	**04**
	(c)	Explain slicing of tessellated cad model in detail with a flowchart.	**07**
		OR	
	(c)	Explain the contour and tool path generation in detail with a flowchart.	**07**
Q.3	**(a)**	List out the application of stereolithography.	**03**
	(b)	Explain any one indirect rapid tooling process.	**04**
	(c)	Compare the shape-based and the product data-based exchange standards. Which has the potential to support industrial automation? Why?	**07**
		OR	
Q.3	**(a)**	List out the application of laminated object manufacturing.	**03**
	(b)	How data points are acquired in reverse engineering? Enlist various methods.	**04**
	(c)	List the various types of solid modeling techniques and explain in detail B-Rep models.	**07**
Q.4	**(a)**	Discuss the advantages and disadvantages of solid ground curing.	**03**
	(b)	Explain different errors in building part of RP processes.	**04**
	(c)	Explain Fused Deposition Modelling process with neat sketch.	**07**
		OR	
Q.4	**(a)**	Discuss the advantages and disadvantages of selective laser sintering.	**03**
	(b)	Explain different errors in post-processing part of RP processes.	**04**
	(c)	Explain Laser Engineered Net Shaping (LENS) with neat sketch.	**07**
Q.5	**(a)**	Explain the application of analysis and planning in rapid prototyping.	**03**
	(b)	Explain the different application of RP in medical.	**04**
	(c)	The part shown in fig is to be fabricated using Stereolithography. 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-	**07**

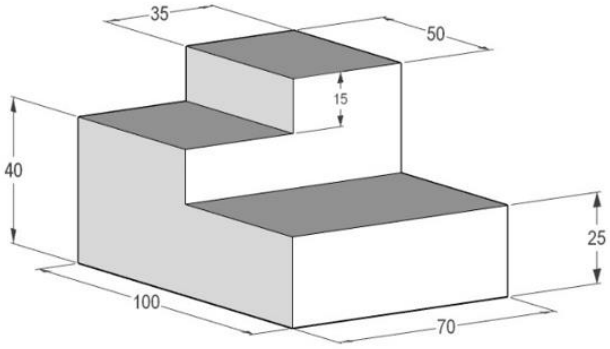
curing. Two different orientations are shown in the fig, find the optimum build up time out of two orientations.

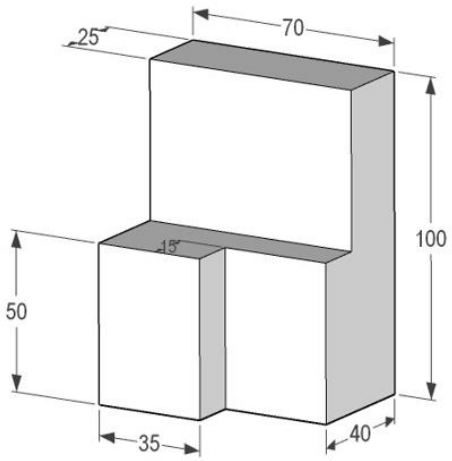
OR

Q.5 **(a)** How does aerospace technology make use of rapid tooling application? **03**

(b) Explain the different application of RP in automobile industry. **04**

(c) The part shown in fig. no. 1 is to be fabricated using Fused deposition modeling. Layer thickness is to be 0.20 mm and the width of the extrudate deposited on the surface of the part = 1.25 mm. The extruder workhead moves in the *x*-*y* plane at a speed of 150 mm/s. A delay of 10 s is experienced between each layer to reposition the workhead. Compute an estimate time required to build the part. Two different orientations are shown in the fig, find the optimum build up time out of two orientations. **07**





ORIENTATION 1 **ORIENTATION 2**

All dimensions are in mm.

Fig. 1

****