



PRESIDENCY UNIVERSITY

BENGALURU

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End - Term Examinations – May / June 2026

Date: 25-05-2026

Time: 01:00pm – 04:00pm

School: SOE	Program: B. Tech	
Course Code : CHE3001	Course Name: Smart Materials and 3D Printing	
Semester: VI	Max Marks: 100	Weightage: 50%

CO - Levels	C01	C02	C03	C04	C05
Marks	02	02	24	44	28

Instructions:

- Read all questions carefully and answer accordingly.
- Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2 marks.

10Q x 2M=20M

1.	List out any four external stimuli modify the properties of smart materials.	2 Marks	L1	C01
2.	Write the name of the starting materials for the synthesis of polyurethane.	2 Marks	L1	C02
3.	Write the common materials utilized for stereolithography technique.	2 Marks	L1	C03
4.	Identify in which 3D printing techniques are utilizing the following materials a) PVA and b) Lithium niobate.	2 Marks	L2	C03
5.	Write any two disadvantages of Directed Energy Deposition (DED) 3D printing technique.	2 Marks	L2	C04
6.	What is FDM? Explain	2 Marks	L2	C04
7.	What are construction 3D printers and WAAM?	2 Marks	L3	C05
8.	Lower CO ₂ Emissions is an added advantages of utilizing 3D printing techniques in aviation field. Justify.	2 Marks	L3	C05
9.	Write a note on Borescope Boss.	2 Marks	L2	C05

10.	Write any two 3D printing techniques widely used to repair functional military equipment.	2 Marks	L2	C05
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Part B

Answer the Questions.

Total Marks 80M

11.	a.	Identify suitable generation of materials with specific materials employed in the following 3D-printing techniques: a) Sheet lamination b) Directed energy deposition, c) Material jetting, d) Vat photopolymerization and e) Material extrusion.	10 Marks	L3	C03
Or					
12.	a.	What are the properties can be analyzed by using mechanical analysis techniques?. Explain in detail with suitable figure.	10 Marks	L3	C03
13.	a.	Write a flow chart for additive manufacturing processes showing the material classes and the corresponding deposition methods.	10 Marks	L2	C03
Or					
14.	a.	Write the recommended 3D printing processes and materials used for aerospace industry applications.	10 Marks	L2	C03
15.	a.	What is VAT photopolymerization in 3D printing? Describe the step-by-step process involved in Vat Photopolymerization with suitable diagram.	10 Marks	L2	C04
Or					
16.	a.	What is material extrusion? List out the advantages and disadvantage of materials extrusion method.	10 Marks	L2	C04
17.	a.	Describe the suitable additive manufacturing techniques, the materials used in each, and their key applications in the defense and construction industries.	10 Marks	L2	C04
Or					
18.	a.	Explain Directed Energy Deposition (DED) 3D printing technique working principle with a suitable diagram. Write any four benefits of the technique.	10 Marks	L2	C04
19.	a.	What is the Sheet Lamination technique in 3D printing? Describe the step-by-step process involved in the Sheet Lamination 3D printing technique along with suitable diagram. Write any three limitations of the technique.	16 Marks	L4	C04
	b.	Write any four commonly used 3D-printing techniques for Powder Bed Fusion (PBF) process.	4 Marks	L4	C04
Or					

20.	a.	Describe the step-by-step process involved in the binder jetting 3D printing technique along with suitable diagram. Write any three advantages and disadvantages of the technique.	14 Marks	L4	C04
	b.	What is Material Jetting 3D printing technique? What are advantages and disadvantages of material jetting 3D printing technique?	6 Marks	L4	C04

21.	a.	Explain the applications of 3D printing in the healthcare and medical industry with suitable examples.	10 Marks	L2	C05
	b.	What is the role of 3D printing in the electrical and electronics industry? Explain 3D printed antenna and interconnects.	10 Marks	L2	C05

Or

22.	a.	Write a detailed note on 3D printing technique for automotive industry.	10 Marks	L2	C05
	b.	What are the benefits and challenges of 3D printing in fabric and fashion industry?	10 Marks	L2	C05