



PRESIDENCY UNIVERSITY

BENGALURU

Roll No.													
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End - Term Examinations -MAY 2025

Date: 30-05-2025

Time: 01.00 pm – 04:00 pm

School: SOE	Program: B. Tech	
Course Code: MEC3014	Course Name: Smart Materials	
Semester: IV	Max Marks: 100	Weightage: 50%

CO - Levels	C01	C02	C03	C04	C05
Marks	12	28	60	-	-

Instructions:

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

Part A

Answer ALL the Questions. Each question carries 2marks.

10Q x 2M=20M

1.	What is the Villari effect?	2 Marks	L1	C01
2.	Define magnetostriction.	2 Marks	L1	C01
3.	What is MEMS?	2 Marks	L1	C01
4.	What is a direct piezoelectric effect?	2 Marks	L1	C01
5.	What is pseudoelasticity?	2 Marks	L1	C01
6.	What are sensors and actuators?	2 Marks	L1	C02
7.	SMAS can exist in two phases, with three different crystal structures. List three crystal structures.	2 Marks	L1	C02
8.	Define passive smart materials.	2 Marks	L1	C01
9.	List four sensors used in MEMS.	2 Marks	L1	C02
10.	Define total internal reflection.	2 Marks	L1	C02

Part B

Answer the Questions.

Total Marks 80M

11.		Summarize the processing steps of photolithography with a neat sketch.	20 Marks	L2	C03
Or					
12.	a.	Explain how the oxidation principle is used in microsystem fabrication.	10 Marks	L2	C03
	b.	List out the various etching processes and explain in detail with relevant diagrams	10 Marks	L1	C03
13.	a.	List out the components of a fiber optic. Explain briefly about each component.	10 Marks	L1	C03
	b.	List the advantages of optical fibers over copper wire in transferring information from one point to another.	10 Marks	L1	C03
Or					
14.	a.	Explain two Ray theories used to describe the transmission of light through optical fibers.	10 Marks	L2	C03
	b.	Briefly explain the modes in optical fiber. Differentiate between ray theory and mode theory.	10 Marks	L4	C03
15.	a.	Define a shape memory alloy? Explain the Shape memory effect in NiTiNoL in terms of phase transformation.	10 Marks	L2	C02
	b.	Explain Pseudo-elasticity. Classify the types of shape memory alloy.	10 Marks	L2	C02
Or					
16.	a.	How can one control active and passive vibration control using shape memory alloys?	10 Marks	L1	C02
	b.	Outline the challenges and limitations associated with NiTiNoL.	10 Marks	L2	C02
17.	a.	Explain briefly the LIGA process.	10 Marks	L2	C03
	b.	Explain briefly the flow process involved in the fabrication of microelectronics.	10 Marks	L2	C03
Or					
18.	a.	List at least 5 disadvantages of composite shape memory alloy over conventional materials.	10 Marks	L2	C03
	b.	List smart polymer composite materials.	10 Marks	L1	C03