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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING  
END TERM EXAMINATION - Aug 2024**

<b>Semester :IV</b>	<b>Date : 06/08/24</b>
<b>Course Code : MEC3014</b>	<b>Time : 9.30 AM – 12.30 PM</b>
<b>Course Name : Smart Materials</b>	<b>Max Marks :100</b>
<b>Program : B.Tech.</b>	<b>Weightage : 50%</b>

**Instructions:**

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

**PART A  
ANSWER ANY 5 QUESTIONS**

**5Q X 2M=10M**

- 1 What are piezochromic materials? (CO 1) [Knowledge]
- 2 Define thermoelasticity? (CO 2) [Knowledge]
- 3 Name any four smart materials. (CO 2) [Knowledge]
- 4 What are smart materials? (CO 1) [Knowledge]
- 5 Define strength and stiffness. (CO 2) [Knowledge]
- 6 Advantages of smart materials. (CO 2) [Knowledge]
- 7 Difference between smart materials and conventional materials. (CO 1) [Knowledge]

**PART B  
ANSWER ANY 5 QUESTIONS**

**5Q X 10M=50M**

- 8 Define chromic materials. Classify chromic materials based on their stimuli. (CO 2) [Comprehension]
- 9 Write at least 5 disadvantages of composite shape memory alloy over conventional materials. (CO 3) [Comprehension]

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|----|---|--------|-----------------|
| 10 | Differentiate between electrostrictive material and piezoelectric materials in 5 points.      | (CO 2) | [Comprehension] |
| 11 | How one can control active and passive vibration control using shape memory alloys.           | (CO 3) | [Comprehension] |
| 12 | Define magnetorheological fluid. Write the basic composition and application of these fluids. | (CO 2) | [Comprehension] |
| 13 | Write an overview of piezoelectricity in polymers.  | (CO 2) | [Comprehension] |
| 14 | Mention the challenges and limitations associated with NiTiNoL.                               | (CO 3) | [Comprehension] |

**PART C**

**ANSWER ANY 2 QUESTIONS**

**2Q X 20M=40M**

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|----|--|--------|---------------|
| 15 | (a) What is a shape memory alloy? Explain the Shape memory effect in NiTiNoL in terms of phase transformation. | (CO 4) | [Application] |
|    | (b) Explain Pseudo-elasticity. Classify the types of shape memory alloy.                                       |        |               |
| 16 | (a) List 3 advantages and 3 limitations of shape memory alloy.   | (CO 4) | [Application] |
|    | (b) Write five applications of shape memory alloy.   |        |               |
| 17 | (a) Explain optical fiber. Classify it based on the number of modes and reflective index.                      | (CO 4) | [Application] |
|    | (b) Mention the advantages, disadvantages and application of optical fibers.                                   |        |               |