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GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

# PRESIDENCY UNIVERSITY
# BENGALURU

## SCHOOL OF ENGINEERING

### TEST - 1

**Even Semester**: 2018-19 | **Date**: 06 March 2019

**Course Code**: MEC 326 | **Time**: 1 Hour

**Course Name**: Smart Materials | **Max Marks**: 40

**Programme & Sem**: B.Tech (DE) & VI Sem | **Weightage**: 20%

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**Instructions:**

*Read the question properly and answer accordingly.*

*Question paper consists of 3 parts.*

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### Part A

Answer **any three** Questions. **Each** question carries **four** marks. (3Qx4M=12)

1. Define smart mart materials. Give any 4 examples smart materials.
2. What is composite? Give any 4 examples of manmade composites.
3. Classify composite material based on matrix used with necessary flow chart.
4. Explain how piezoelectric materials used in actuators.

### Part B

Answer **both** Questions. **Each** question carries **eight** marks. (2Qx8M=16)

5. Explain with neat sketch two types of structural composites.
6. What are the characteristics of ceramics and give any four examples of areas wherein engineering ceramics have found.

### Part C

Answer the Question. Question carries **twelve** marks. (1Qx12M=12)

7. Name 6 current generation actuator materials and explain any 3 with necessary sketches.

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# PRESIDENCY UNIVERSITY
# BENGALURU

## SCHOOL OF ENGINEERING

### TEST - 2

**Even Semester**: 2018-19 | **Date**: 16 April 2019

**Course Code**: MEC 326 | **Time**: 1 Hour

**Course Name**: Smart Materials | **Max Marks**: 40

**Program & Sem**: B.Tech & VI Sem (DE) | **Weightage**: 20%

**Instructions:**

*(i) **Read the question properly and answer accordingly.***

*(ii) **Question paper consists of 3 parts.***

### Part A

Answer **both** the Questions. **Each** question carries **four** marks. (2Qx4M=8)

1. What is LED? What are the applications of LED?
2. Explain with neat sketch principle of working of piezoelectric effect.

### Part B

Answer **both** the Questions. **Each** question carries **seven** marks. (2Qx7M=14)

3. Explain with sketch how shape memory alloys are used in coupling of pipes.
4. Explain with neat sketch Direct and Converse piezoelectric effect.

### Part C

Answer **both** the Questions. **Each** question carries **nine** marks. (2Qx9M=18)

5. a) Define Photonics. Name any 4 applications of Photonics.
   b) Explain how piezoelectric materials used in generation of electricity by specially designed roads.
6. Explain with neat sketch working of one way and two way shape memory alloys.

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# PRESIDENCY UNIVERSITY
# BENGALURU

## SCHOOL OF ENGINEERING

### END TERM FINAL EXAMINATION

**Even Semester**: 2018-19 | **Date**: 23 May 2019

**Course Code**: MEC 326 | **Time**: 3 Hours

**Course Name**: Smart Materials | **Max Marks**: 80

**Program & Sem**: B.Tech & VI sem | **Weightage**: 40%

**Instructions:**

*(i) Read the question properly and answer accordingly.*

*(ii) Question paper consists of 3 parts, A, B and C.*

## Part A

Answer **all** the Questions. **Each** question carries **one** mark. (20Qx1M=20M)

1.a Cemet means.....

b. Isotropic material means.....

c. The device which converts energy from one form to another.....

d. MEMS stands for.....

e. Shape memory alloys can regain up to .....% of strain by subjecting them to heat.

f. Terfenol-D is an example of ..... material.

g. The sensor which is used to find arterial blood gas measurement.....

h. Name any two examples of natural piezoelectric material.

i. Identify the material which does not come under the smart material list.

i) MR fluids ii) ER fluids iii) Halochromic material iv) Silicon oil

j. Which of the following is the lightest among the following?

i) Magnesium ii) Aluminum iii) Titanium iv) Copper

k. The application where composites are not used.

i) Car body ii) Engine iii) Brake pad iv) Spoilers

l. Aerospace material should not be having .....property.

i) Stronger ii) High density iii) Corrosion resistance iv) Temperature Resistance

m. The alloy which does not behave shape memory effect

i) Ni-Ti alloys ii) Cu-Zn-Al alloys iil) Cu-Al-Ni alloys iv)Al-Si Alloys

n. Not an example for the actuator

(i) Optical fiber (ii) Shape memory alloys (iii) Magneto-strictive materials (iv) Electro rheological fluids

o. Strong and ductile materials

(i) Polymers (ii) Ceramics (iii) Metals (iv) Semiconductors

p. Detrimental property of material for shock load applications

(i) High density (ii) Low toughness (iii) High strength (iv) Low hardness

q. Which of the following is highly resistant to corrosion?

i) Aluminum ii) Copper iii) Iron iv) Zinc

r. After which point, necking is observed in the stress-strain curve

i) Ultimate strength ii) Yield strength iii) Elastic point iv) Fracture point

s. Greater the angle of inclination of the stress-strain curve less is the elasticity.

i) True

ii) False

t. Plasticity increases with temperature.

i) True

ii) False

## Part B

Answer **all** the Questions. **Each** question carries **six** marks. (5Qx6M=30M)

2. Explain with neat sketch working of one way and two-way shape memory alloys.
3. What is colloidal dispersion? Explain its subgroups.
4. Explain with neat sketch Direct and converse piezoelectric effect.
5. Explain with neat sketch Ultrasonic flaw detecting using piezoelectric transducer.
6. Explain with neat sketch principle of working of shape memory alloys.

## Part C

Answer **all** the Questions. **Each** question carries **ten** marks. (3Qx10M=30M)

7. With a neat sketch, explain how shape memory alloys used in the coupling of pipes.
8. With Suitable sketch, explain charge migration mechanism in ER fluids.
9. Mention three modes of operation of MR fluids. Explain with necessary sketches.