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10AE764

Seventh Semester B.E. Degree Examination, June/July 2019
Smart Materials

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART - A

1 a. What are the characteristics of Ceramics materials? List the applications and advantages of Ceramic materials. **(10 Marks)**

b. What is Shape memory effect? Explain with a neat sketch. **(10 Marks)**

2 a. What are Sensors? How they are classified? Explain the area of application of any two types of sensors. **(10 Marks)**

b. What is Signal Processing? Briefly explain pulse amplitude modulation and pulse width modulation, with neat sketches. **(10 Marks)**

3 a. Discuss the design considerations of a basic MR device. **(12 Marks)**

b. What are the typical MR fluid properties? **(04 Marks)**

c. What are the advantages of MR fluid? **(04 Marks)**

4 a. Explain the principle of operation of Fiber Optic Fabry – Perot Sensor. **(10 Marks)**

b. What is Total Internal Reflection? Explain with respect to Optical fibers. **(10 Marks)**

PART - B

5 a. What are Smart Skins? Mention any two applications of Smart Skins. **(04 Marks)**

b. What do you mean by drag and turbulence? Explain with a neat sketch. **(06 Marks)**

c. Explain with a neat sketch, the activation of smart skins using Piezo Electric Actuators. **(10 Marks)**

6 a. Discuss the application of smart materials in active structural control. **(12 Marks)**

b. Briefly explain with a neat sketch, vibration control of a cantilever beam using shape memory alloys. **(08 Marks)**

7 a. Explain PZT and PVPF piezoelectric materials highlighting their properties, advantages and applications. **(12 Marks)**

b. Write notes on Micro – Electro – Mechanical System (MEMS) indicating their applications. **(08 Marks)**

8 Write short notes on the following :

a. Neural Networks.

b. Data Processing.

c. Data Visualization.

d. Reliability of data. **(20 Marks)**

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