10AE764

Seventh Semester B.E. Degree Examination, Jan./Feb.2021
Smart Materials

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1 a. What is a ceramic matrix composite? **(08 Marks)**
   b. Explain how Nitinol is manufactured. **(06 Marks)**
   c. Describe the transformation of Martinsite to Austinite. **(06 Marks)**

2 a. What is EMAT? What are the advantages of EMAT transducer over piezoelectric transducer? **(10 Marks)**
   b. Write short notes on:
       i) Lorentz Force
       ii) Disadvantages of EMAT compared to piezoelectric ultrasonic testing. **(10 Marks)**

3 a. What are ER fluids? **(06 Marks)**
   b. What are the material properties of MR/ER fluids? **(06 Marks)**
   c. Describe the use of ER/MR fluid is a damper and their responses. **(08 Marks)**

4 a. Explain the working principle of optic fibre with suitable neat sketch and write on its advantages , applications. **(10 Marks)**
   b. Write short notes on :
       i)   Numerical aperture.
       ii) Working principle of crack detection system using optical fibre in smart structure. **(10 Marks)**

PART – B

5 a. Explain the design principle of active skin based actuation structure using SMA piezoelectric materials. **(10 Marks)**
   b. Explain the application of smart structure in aerospace and transportation vehicles. **(10 Marks)**

6 a. With suitable examples, explain distributed analog and digital feedback control systems. **(10 Marks)**
   b. What are the dimensional implications of structural control? **(10 Marks)**

7   Explain :
       i)   PCT actuaters
       ii) MEMS.
       iii) magnetic shape memory alloys
       iv) applications of the above. **(20 Marks)**

8 a. How do you process the information with the help of neural network and data processing? **(10 Marks)**
   b. Explain the principle and application domain of data visualization and reliability. **(10 Marks)**

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