10AE764

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020

Smart Materials

Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a. What are Composite Materials? How composite materials are classified? Mention the important characteristics of composite materials. **(10 Marks)**

   b. What is Shape Memory phenomenon? Explain with neat sketch. Also explain one way, two way shape memory effect with neat sketch mentioning its applications. **(10 Marks)**

2 a. What are Sensors? Describe the type of sensors and its applications. **(10 Marks)**

   b. Write a short note on :
   i) Chemical sensor
   ii) Mechanical sensor. **(10 Marks)**

3 a. What do you mean by Magneto Rheological fluids? Explain the working principle of MR fluids with suitable sketch. **(04 Marks)**

   b. Briefly explain the modes of operation of MR fluids with suitable sketch. Mention the application of each mode of operation. **(08 Marks)**

   c. With a neat sketch, explain the working of MR fluid damper. **(08 Marks)**

4 a. Derive the equation for Numerical Aperture from incidence angle and the incidence of refraction. **(08 Marks)**

   b. Briefly describe the optic fiber characteristics. **(06 Marks)**

   c. What are active and adaptive optical systems? **(06 Marks)**

PART – B

5 a. Explain the applications of structures in aerospace and transportation vehicles. **(10 Marks)**

   b. Discuss in brief manufacturing, repair and maintainability aspects of structures. **(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 a. How smart structure can reduce vibration in real time. **(08 Marks)**

   b. Write short notes on :
   i) MEMS **(03 Marks)**
   ii) Advantages of piezo electric actuator. **(03 Marks)**

   c. What is Magnetic Shape Memory Alloy and their properties? **(06 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)**

* * * * *