305509

December, 2019
B.Tech. (ECE) -V SEMESTER
Smart Material and Systems (OEL501)

Time : 3 Hours]   [Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*

2. *Answer any four questions from Part-B in detail.*

3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART - A

1.   (a) What is principle of piezoelectricity?   (1.5)

    (b) How vibrations can be used as a source of energy?   (1.5)

    (c) Why the shape of the material is important?   (1.5)

    (d) Differentiate between sensor and actuator.   (1.5)

    (e) Why do we call materials smart?   (1.5)

(f) State the characteristics of memory materials. (1.5)

(g) What are the applications of smart materials? (1.5)

(h) What does ER stands for? (1.5)

(i) Where does MEMS require smart materials? (1.5)

(j) What is the difference between simulation and emulation? (1.5)

PART - B

2. (a) How piezoelectric materials are helpful in designing a health monitoring systems? Explain with a suitable example. (10)

   (b) Explain the concept of energy harvesting. (5)

3. (a) Enumerate the characteristics of shape memory materials. (5)

   (b) How these materials are helpful in designing health monitoring system. Give a suitable real time application in support of your defence. (10)

4. Analyze and give a design technique which offers a solution to industrial problem using smart materials. (15)

5. (a) What is the composition of MR fluid? (5)

   (b) What are the industrial applications of a MR fluid? Give the control smart material based structure and explain a simulation process for it. (10)

6. (a) What is charge migration mechanism? Explain. (5)

   (b) What is the concept of bio inspired engineering? Give a specific real time application for the same. (10)

7. (a) Compare the concept of magnetostrictive and electrostrictive materials. Where these two are used. (5)

   (b) Explain the realization of MEMS using smart materials. (10)

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