

Roll No.

Total Pages : 3

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)

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- (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)