CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

15ME745

Seventh Semester B.E. Degree Examination, July/August 2022
Smart Materials and MEMS

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What are smart materials? Explain its applications in various fields. **(08 Marks)**
   b. Explain piezo electric effect. Describe the working of Inch Worm Linear Motor with neat sketch. **(08 Marks)**

OR

2 a. What are shape memory alloys? Explain the vibration control through shape memory alloys. **(08 Marks)**
   b. Write the applications of shape memory alloys. **(08 Marks)**

Module-2

3 a. Identify the properties and characteristics of MR/ER fluids. **(08 Marks)**
   b. Discuss the application of ER/MR fluids in dampers of mechanical vibration. **(08 Marks)**

OR

4 a. Explain the working principle of fiber optics in crack detection. **(08 Marks)**
   b. Explain the principle of total interval reflection in optical fibers and its application in strain measurement. **(08 Marks)**

Module-3

5 a. Sketch and explain Gyroscopic vibration absorbers. **(08 Marks)**
   b. Explain with sketches active vibration absorbers. **(08 Marks)**

OR

6 a. What is biomimetics? Explain the characteristics of natural structures. **(08 Marks)**
   b. Discuss the :   (i) fiber-reinforced organic matrix   (ii) ceramic matrix composites, with reference to Mollusks. **(08 Marks)**

Module-4

7 a. What is MEMS? Explain the intrinsic characteristics of MEMS. **(08 Marks)**
   b. Explain with the neat sketch the process of wafer dicing. **(08 Marks)**

OR

8 a. Discuss the cantilever piezoelectric actuator mode with neat sketch. **(08 Marks)**
   b. Write the advantages and disadvantages in major methods of sensing and actuation. **(08 Marks)**

Module-5

9 a. What are polymer MEMS? List the properties of any two widely used polymer MEMS. **(08 Marks)**
   b. Discuss the design and fabrication of channels and valves for micro fluid systems. **(08 Marks)**

OR

10 a. Discuss the MEMS sensor in Blood Pressure Monitoring. **(08 Marks)**
    b. Discuss the application of MEMS sensor in microphone development. **(08 Marks)**

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