CBCS SCHEME

USN | | | | | | | | | | |

15ME745

Seventh Semester B.E. Degree Examination, Jan./Feb. 2021
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. Compare open and closed loop smart structures quoting suitable examples. **(08 Marks)**
b. List important characteristics and applications of shape memory alloys. **(08 Marks)**

OR

2 a. Elaborate on the influence of stress on characteristic temperatures with relevant equations. **(08 Marks)**
b. Explain the concept of multiplexing embedded NiTiNOL actuators. **(08 Marks)**

Module-2

3 a. Highlight on the mechanisms and properties of ER/MR fluids. **(08 Marks)**
b. Explain the application of ER/MR fluids in clutches. **(08 Marks)**

OR

4 a. Explain the principle of total internal reflection employed optical fibres. **(04 Marks)**
b. State the important characteristics of optical fibres. **(06 Marks)**
c. Write a note on the application of optical fibres in crack detection. **(06 Marks)**

Module-3

5 a. What is a vibration absorber? Explain the principle of Gyroscopic Vibration absorbers. **(06 Marks)**
b. Write a note on control of structures. **(04 Marks)**
c. State the control strategies and limitations. **(06 Marks)**

OR

6 a. State the important characteristics of Natural Structures. **(06 Marks)**
b. Explain the characteristics of following natural composites: (i) Wood (ii) Mollusks **(10 Marks)**

Module-4

7 a. Briefly explain the intrinsic characteristics of MEMS. **(08 Marks)**
b. Explain with a schematic diagram the steps involved in thin film deposition process. **(08 Marks)**

OR

8 a. Explain the concepts and principles behind Magnetic actuation systems. **(08 Marks)**
b. Make a comparison between major sensing and actuation methods. **(08 Marks)**

Module-5

9 a. Suggest three materials for polymer MEMS and state the reasons for their selection. **(09 Marks)**
b. Write a note on the design and fabrication of channels of valves. **(07 Marks)**

OR

10 a. Discuss the design considerations of MEMS sensors in microphones. **(08 Marks)**
b. Write a note on MEMS product development. **(08 Marks)**

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