

CBCS SCHEME

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17ME745

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

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain briefly Closed loop and Open loop structures with examples. (10 Marks)
b. Explain Piezoelectric effect. Describe the working of Inch worm linear motor, with neat sketch. (10 Marks)

OR

- 2 a. Explain Shape Memory Effect. List the applications of Shape Memory Alloys. (10 Marks)
b. Discuss the influence of stress on characteristic temperature of Shape Memory Alloys with Mathematical expression. (10 Marks)

Module-2

- 3 a. Discuss the properties and characteristics of Electro rheological and Magneto rheological fluids. (10 Marks)
b. Discuss the applications of MR/ER fluids in clutches and dampers. (10 Marks)

OR

- 4 a. Explain the working principle of fibre optics in crack detection. (06 Marks)
b. Explain the basic principle governing the Operation of Optical fibre. (04 Marks)
c. Explain Twisted and Braided Fibre Optic Sensors. (10 Marks)

Module-3

- 5 a. Derive equations to analyse parallel damped vibration absorber. (10 Marks)
b. Explain briefly the Smart control of structures. (10 Marks)

OR

- 6 a. Discuss briefly the challenges and opportunities of Biomimetics. (10 Marks)
b. Discuss the characteristics of Natural Structures quoting relevant examples. (10 Marks)

Module-4

- 7 a. Explain briefly the intrinsic characteristics of MEMS. (10 Marks)
b. Explain with neat sketch, Dry etching of thin films. (10 Marks)

OR

- 8 a. List the properties and application of Piezoelectric materials. (10 Marks)
b. Explain Major methods of sensing and actuation. (10 Marks)

Module-5

- 9 a. List the applications where polymers MEMS are success. Discuss any two. (10 Marks)
b. List any three materials for polymer MEMS. (06 Marks)
c. Write the considerations for selection of sensors in MEMS. (04 Marks)

OR

- 10 a. Discuss the design of Gyro MEMS in Automobiles. (10 Marks)
b. Write a short note on MEMS product development. (10 Marks)
