

CBCS SCHEME

15ME745

Librarian
Learning Resource Centre
Acharya Institute of Technology
USN

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Seventh Semester B.E. Degree Examination, Feb./Mar. 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. Discuss the applications of Smart Materials in various domains. (06 Marks)
b. Describe the working of Inch Worm linear motor, with neat sketch. (10 Marks)

OR

- 2 a. Explain one way Shape Memory Effect. (06 Marks)
b. List the applications of Shape Memory alloys. (04 Marks)
c. Discuss vibration control in cantilever beams using NiTiNOL wire – Suspended mass system at the free end of the beam. (06 Marks)

Module-2

- 3 a. Describe any one model predicting the behavior of MR / ER fluids. (06 Marks)
b. Discuss the applications of ER/MR fluids in clutches and dampers. (10 Marks)

OR

- 4 a. What are Fiber Optic Sensors? (04 Marks)
b. Write a short note on Twisted and Braided Fiber Optic Sensors. (04 Marks)
c. With a neat sketch, explain principles of light transmission through optical fiber by total internal reflection. (08 Marks)

Module-3

- 5 a. Derive the condition for the amplitude of the main mass in a parallel damped vibration absorber to be independent of damping ratio. (12 Marks)
b. Write a short note on Active Vibration Absorbers. (04 Marks)

OR

- 6 a. List the characteristics of Natural structures, with necessary examples. (06 Marks)
b. Explain the structural design of wood as Fiber – reinforced Organic Matrix Composite. (06 Marks)
c. Write a short note on Bio – mimetic Sensing. (04 Marks)

Module-4

- 7 a. What is MEMS? List any three MEMS Sensors used in automobiles. (08 Marks)
b. With a neat sketch, explain the process of Photo - Lithography. (08 Marks)

OR

- 8 a. Explain the working of a MEMS based Acoustic Sensor (Microphone) using a Piezo – Electric Material. (08 Marks)
b. Describe the process for electro plating of Magnetic Materials. (08 Marks)

Module-5

- 9 a. Discuss the role of polymer MEMS in Pressure Sensors. (08 Marks)
b. Explain the steps involved in the fabrication of PDMS Micro fluid channels. (08 Marks)

OR

- 10 a. Discuss the design considerations of MEMS BP sensors. (08 Marks)
b. Explain the working of Gyro Sensors in automobiles while taking a turn. (08 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.