



# CBCS SCHEME

17ME745

## Seventh Semester B.E. Degree Examination, Jan./Feb.2021 Smart Materials and MEMS

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. Missing data may be suitably be assumed.

### Module-1

- 1 a. What are smart materials? Explain its applications in various fields. (10 Marks)  
b. Explain Piezo electric properties of smart materials. (10 Marks)

OR

- 2 a. Discuss the vibration control through shape memory alloys. (10 Marks)  
b. Discuss the advantages of multiplexing embedded NiTiNOL actuators. (10 Marks)

### Module-2

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

OR

- 4 a. Explain Total internal reflection phenomenon in optical fibers. (08 Marks)  
b. List the applications of optical fibers as sensors. (06 Marks)  
c. Explain the working principle of fiber optics in crack detection. (06 Marks)

### Module-3

- 5 a. Explain briefly the smart control of structures. (10 Marks)  
b. Sketch and explain perissogyro vibration absorber. (06 Marks)  
c. Write a short note on active vibration absorbers. (04 Marks)

OR

- 6 a. Explain Fibre-Reinforced organic matrix natural composites. (10 Marks)  
b. Explain the micro structural design of toughness mechanisms in mollusks. (10 Marks)

### Module-4

- 7 a. Explain the phenomenon of photolithography. (10 Marks)  
b. Explain briefly thin film deposition fabrication of MEMS. (10 Marks)

OR

- 8 a. Explain Cantilever piezoelectric actuator-model. (10 Marks)  
b. Explain the working of Piezo-electric Tactile sensors. (10 Marks)

### Module-5

- 9 a. Explain briefly the design and fabrication of channels and valves using MEMS. (10 Marks)  
b. Elaborate the applications and characteristics of polymer MEMS. (10 Marks)

OR

- 10 a. Discuss the design consideration of MEMS in blood pressure monitoring of patients. (10 Marks)  
b. Write a short note on MEMS product development. (10 Marks)

\* \* \* \* \*

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.