CBCS SCHEME

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

17ME745

Seventh Semester B.E. Degree Examination, June/July 2023
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. Write the comparison between closed loop and open loop smart structures. **(05 Marks)**
b. Explain the applications of smart structures. **(05 Marks)**
c. Explain briefly shape memory alloys and shape memory effect. **(10 Marks)**

OR

2 a. Explain briefly influence of stress on temperature characteristics. **(07 Marks)**
b. Explain multiplexing embedded NiTiNOL octavos. **(08 Marks)**
c. Explain vibration control through shape memory alloys. **(05 Marks)**

Module-2

3 a. Write the applications of Electroheological [ER] and Magnetorhealogical fluids [MR]. **(05 Marks)**
b. Write the properties of ER and MR. **(08 Marks)**
c. Explain fluid composition and behavior of ER and MR fluids. **(07 Marks)**

OR

4 a. Explain the integration of fibre optic sensors and shape memory elements. **(10 Marks)**
b. Define fibre optic strain sensors and explain twisted and braided fibre optic sensors. **(10 Marks)**

Module-3

5 a. Explain parallel damped vibration obsorber. **(05 Marks)**
b. Explain analysis and experimental set up of Gyroscopic vibration absorbers. **(10 Marks)**
c. Explain Active vibration obsorbers. **(05 Marks)**

OR

6 a. Example briefly organic matrix natural composites and natural creamers. **(10 Marks)**
b. Define biomimetrics and write the characteristics of natural structures. **(10 Marks)**

Module-4

7 a. Define micro electromechanical system and explain the intrinsic characteristics. **(05 Marks)**
b. Explain briefly the following :
i) Photolithography
ii) Thermal oxidation
iii) Thin film deposition. **(15 Marks)**

OR

8 a. Write the properties of piezoelectric material. **(07 Marks)**
b. Explain briefly the concepts and principles of magnetic actuation. **(08 Marks)**
c. Write the comparison of major sensing and actuation methods. **(05 Marks)**

Module-5

9	a.	Write the application of polymers for MEMS.	(08 Marks)
	b.	Explain design and fabrication of selective components.	(07 Marks)
	c.	Explain briefly motivation for micro fluids.	(05 Marks)

OR

10		Explain briefly the following MEMS product development	
	a.	Preformnce	
	b.	Accuracy	
	c.	Reliability	
	d.	Managing cost	
	e.	Market uncertainties.	(20 Marks)

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