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18MAR253

## Second Semester M.Tech. Degree Examination, June/July 2019 Micro Electro Mechanical System

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Briefly explain the following: i) Thermal MEMS ii) Mechanical MEMS  
iii) Micro fluidic system iv) Magnetic MEMS. (16 Marks)  
b. List the application of MEMS. (04 Marks)

OR

- 2 a. Explain the basic principles of Microsensors and Microactuator, with its application. (10 Marks)  
b. Write a note on precision and ultraprecision engineering. (10 Marks)

### Module-2

- 3 a. Explain the working principle of micro machining with suitable sketch. (10 Marks)  
b. Write a note on Dry etching and wet etching. (10 Marks)

OR

- 4 a. List out the difference between Bulk micro machining and surface micromachining. (10 Marks)  
b. Explain the basic principle of sensing and actuation in mechanical MEMS. (10 Marks)

### Module-3

- 5 a. Explain U-shaped horizontal electro thermal actuator's working principle. (10 Marks)  
b. List out the important consideration on micro scale fluid. (10 Marks)

OR

- 6 a. Explain the working principle of micro spring thermal actuator. (10 Marks)  
b. Write a note on Piezoelectric material as sensing and actuating elements. (10 Marks)

### Module-4

- 7 a. Explain sacrificial layer processes with a neat sketch. (10 Marks)  
b. List the advantage, disadvantage and application of surface micro machining. (10 Marks)

OR

- 8 a. Explain briefly how the polysilicon surface micro machining takes place. (12 Marks)  
b. List the requirements of surface micro machining. (08 Marks)

### Module-5

- 9 a. With neat diagram, explain working of Scanning Probe Microscopy (SPM). (10 Marks)  
b. With neat sketch, explain working of Scanning Tunneling Microscopy (STM). (10 Marks)

OR

- 10 a. With neat diagram, explain working of Scanning Electron Microscopy (SEM). (10 Marks)  
b. With neat sketch, explain working of Magnetic Force Microscopy. (10 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.