

Day: Tuesday
Date: 28/05/2019

Time: 02.30 PM TO 05.30 PM
Max. Marks: 60

S-2019-2936

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.

Q.1 Define MEMS and microsystem. Also with the help of a block diagram explain in detail MEMS as a sensor and MEMS as an actuator. **(10)**

OR

- Q.1 a)** Differentiate between microsystem and microelectronics. Also explain the applications of MEMs in various fields. **(05)**
- b)** Explain scaling laws in miniaturization with the help of following term: **(05)**
- i) Heat Transfer
 - ii) Electricity

Q.2 Define micro total analysis system (μ TAS) with the help of a block diagram. Also explain in detail μ - TAS separation and μ - TAS detection system. **(10)**

OR

- Q.2 a)** Write a note on following materials for MEMS: **(05)**
- i) Gallium arsenide
 - ii) Piezoelectric material
- b)** Describe the detail cell handling and characterization system. **(05)**

Q.3 Explain in detail electrostatic sensing and actuation and magnetic sensing and actuation with neat schematic. **(10)**

OR

- Q.3 a)** Write a note on: **(05)**
- i) Neural interfaces
 - ii) Microsurgical tools
- b)** Describe in detail micro needles and drug delivery system. **(05)**

Q.4 What is LIGA? Explain in detail working of LIGA technology with suitable diagram. **(10)**

OR

Q.4 Explain in detail procedure for bulk micromachining. Also give the major difference between bulk and surface micromachining. **(10)**

Q.5 Define MEMS. Also explain various techniques for MEMs packaging. **(10)**

OR

Q.5 With the help of neat schematic, explain in detail MEMS metrology. **(10)**

Q.6 With the help of a neat diagram. Explain MEMs based capacitive accelerometer. **(10)**

OR

Q.6 Explain in detail following MEMs based software: **(10)**

- i) MATLAB
- ii) AutoCAD
- iii) Spice