			 			 	11.00	
USN	14	1					10NT75	1

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018 MEMS and NEMS

Time: 3 hrs. Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- a. Explain the process of IC fabrication steps and also mention the advantages and disadvantages of IC's. (10 Marks)
 - b. What are Microsensors? How the sensors are classified and also explain about mechanical sensors? (06 Marks)
 - c. Write short note on Magnetic MEMS. (04 Marks)
- 2 a. Write short notes on: i) Micro grippers ii) Gyroscopes iii) Micro mirrors. (10 Marks)
 - b. Explain the principle of sensing mechanisms and mention the different types of actuators.
 - (06 Marks)
 - c. Briefly explain the working principle of conductometric sensors. (04 Marks)
- 3 a. What is Micromachining? Explain bulk micromachining and surface micromachining in detail, with a neat schematic diagram. (08 Marks)
 - b. Explain the different steps involved in Photolithography, with neat schematics. (08 Marks)
 - c. What is Bonding? Briefly explain different types of wafer bonding. (04 Marks)
- 4 a. Mention different types of MEMS materials used for fabrication of MEMS devices and explain them briefly. (10 Marks)
 - b. Explain in detail about design considerations, selection of materials and selection of manufacturing process of MEMS. (10 Marks)

PART - B

- 5 a. Explain in detail the sensing mechanism of Surface Acoustic Wave (SAW) sensors.
 - (08 Marks)
 - b. Write short notes on DNA sensors, Calorimetric sensors and Peltier effect heat pump.
 (12 Marks)
- 6 a. Explain case studies on DMD (Digital Mirror Device) in detail. (12 Marks)
 - b. Explain in detail about the transient properties and scaling effects of MEMS devices.
 - (08 Marks)
- 7 a. Explain in detail how DNA is used as functional template for nanocircuiting. (08 Marks)
 - b. Write short note on DNA Protein conjugates in micro array technologies. (08 Marks)
 - c. Write short notes on Bio Material nanoparticles used for Bio electronic and Bio sensing applications. (04 Marks)
- 8 a. Explain the process involved in the fabrication of NEMS. (08 Marks)
 - b. Write a note on: i) Nano imprint lithography ii) Stencil lithography & Sacrificial etching. (08 Marks)
 - c. What are the future challenges involved in NEMS? Mention some of the applications of NEMS. (04 Marks)
