Exam.Code:0932
Sub. Code: 33705

2055

B.E. (Electronics and Communication Engineering)
Eighth Semester
EC-814: MEMS and Microsystems

Time allowed: 3 Hours Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.

x-x-x

1. a) Define MEMS and Microsystems

   b) What is the affect of reduction in size of wires and the beads on the output of a micro thermocouple?

   c) Describe any two main benefits of surface micromachining over bulk micromachining.

   d) Describe any two benefits of Ion implantation process over Diffusion process, when used for creating p or n type regions.

   e) Which type of lithography process is used in LIGA and why is it preferred over other lithography processes. (5x2)

UNIT - I

2. a) Explain with the aid of a block diagram: MEMS as microsensor & microactuator. How MEMS & Microsystems is different from microelectronics?

   b) Name any three principal signal transduction methods for a micro-pressure sensor. Provide at least one major advantage and one disadvantage of each of the three methods. (6,4)

3. a) Explain in detail scaling laws in electrostatic forces.

   b) A parallel plate capacitor is made of two square plates with the dimensions L=W=1000μm. Determine the normal electrostatic force if the gap between the plates is d=2 μm. The plates are separated by static air. (6,4)

4. a) The thermal diffusivity (m^2/s) of two different materials is: 97.52×10^{-6}, 0.62×10^{-6}, describe the characteristics & application of two materials.

   b) Discuss the properties and applications of main piezoelectric materials used in MEMS and Microsystems. (4,6)

P.T.O.

UNIT - II

5. Explain the various types of etching processes available for shaping the geometry of MEMS component. (10)

6. Discuss in detail, with the aid of diagrams the different steps or processes involved in the surface micromachining of a micro-cantilever beam structure. (10)

7. a) Explain in detail the Device Level packaging of microsystem.
   b) Discuss the different applications of photolithography process in MEMS. (7,3)

x-x-x