**Karunya University**

**(Karunya Institute of Technology and Sciences)**

(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

**Supplementary Examinations – June 2016**

**Subject Title: MICRO ELECTRO MECHANICAL SYSTEMS Time : 3 hours**

**Subject Code:14EC2087 Maximum Marks: 100**

**Answer ALL questions (5 x 20 = 100 Marks)**

1. a. Explain the process of doping in detail. (10)

b. Why is periodic table more important in determining the structure of atoms and molecules? (10)

**(OR)**

2. a. What are the different silicon compounds? Explain its properties in detail. (10)

b. Determine the effect of resistance in silicon and relate how it is related to stress. (10)

3. Explain the process of diffusion in detail with relevant expressions.

**(OR)**

4. a. Explain how a structure is created by adding layer by layer on top of the substrate with neat diagrams. (10)

b. What are the major issues associated in surface micromachining? (10)

5. a. Compare and contrast the characters of wet etching and dry etching. (10)

b. Explain the working of photo transistor and photo diode with neat diagrams. (10)

**(OR)**

6. a. Explain the different etch stop techniques in bulk micromachining in detail with neat diagrams. (12)

b. Discuss in detail about different types of chemical sensors. (8)

7. a. Explain the structure and function of beam resonator in detail. (12)

b. For a comb drive actuator, determine the voltage supply required to pull the moving electrode 10µm from the un stretched position of the spring. The spring constant k is 0.05 N/m. The comb drive is operated in air. The gap between the electrodes and the width of the electrodes are 2µm and 5µm. (8)

**(OR)**

8. Explain micro actuator. Explain the working principle of and the types of micro actuator.

**Compulsory:**

9. a. Discuss in detail about the 3D electromagnetic sensors with neat diagram. (12)

b. How DNA chip can be used in medical applications? Explain (8)