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Total Number of Pages: 02

B.Tech
PEEI5405

8thSemester Regular / Back Examination 2016-17

MICRO ELECTRO MECHANICAL SYSTEMS

BRANCH:ECE, ETC

Time: 3 Hours

Max Marks: 70

Q.CODE:Z217

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

- Q1 Answer the following questions: (2 x 10)**
- a) What is a microsystem? Give some examples.
 - b) Define micromachining. Mention some micro-machined components.
 - c) Differentiate between Microsensors and Micro actuators with examples.
 - d) Name the building blocks of a typical smart system? Mention their equivalent in a biological environment.
 - e) What do you mean by epitaxial growth of Silicon?
 - f) What do you understand by Electro-thermal flow? Where is it used?
 - g) Differentiate between wet and dry oxidation.
 - h) What is the principle of operation of MEMS Accelerometer?
 - i) Enlist the advantages of LIGA.
 - j) Mention two applications of RF MEMS
- Q2 a) What etchants would you select for etching Silicon Dioxide, Poly-silicon, Silicon Nitride and Silicon? (2)**
- b) Discuss the steps involved in both wet and dry etching. (8)**
- Q3 a) Enlist the relative Merits of Piezoresistive, Capacitive and Electromagnetic Sensing Methods. (3)**
- b) Discuss the sequence of process of Ion implantation with proper illustrations. (7)**
- bput question papers visit <http://www.bputonline.com>
- Q4 a) Discuss different wafer bonding techniques. (5)**
- b) Discuss some Microsystem Packages. Define Stiction. How can it be avoided? (5)**
- Q5 a) Discuss the process of Evaporation and Sputtering with suitable illustrations. (5)**
- b) What is CVD? What are the parameters that influence CVD? Compare between different CVD techniques based on temperature and pressure of operation and material used (5)**
- Q6 a) Enlist some limitations of photolithography. Compare between optical lithography and soft lithography. (5)**
- b) Discuss the Bulk Micromachining technique in details with suitable examples and illustrations. (5)**

- Q7** a) Detail the steps involved in the fabrication of MEMS Inductor. (5)
b) Find the spring constant for an axially loaded silicon beam of length 100 μ m and square cross-section of 2 μ m on a side. Use a value of 160 GPa for the Young's modulus of silicon. (5)

- Q8** Write short answer on any TWO: (5 x 2)
a) MEMS Gyroscope
b) PDMS
c) Pressure Sensors
d) Beam Splitter