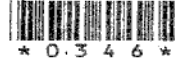


M.E. Second Semester (Digital Electronics) (Part Time / Full Time) (C.G.S.- New)

**13235 : Elective-II : Micro Electro Mechanical System : 2 UMEF 5**

P. Pages : 2

Time : Three Hours



**AW - 3496**

Max. Marks : 80

- Notes :
1. Answer **three** question from Section A and **three** question from Section B.
  2. Due credit will be given to neatness and adequate dimensions.
  3. Assume suitable data wherever necessary.
  4. Illustrate your answer necessary with the help of neat sketches.
  5. Use of pen Blue/Black ink/refill only for writing the answer book.

1. a) Explain difference between microsystems and microelectronics. 7
- b) Explain the benefits of miniaturization. 7

**OR**

2. a) Explain the challenges of MEMS. 7
- b) Explain the development of MEMS technology. 7
3. a) Explain the application of MEMS in medical systems. 7
- b) Explain the application of MEMS in automotives sensors. 6

**OR**

4. a) Explain the application of MEMS in structural health monitoring. 7
- b) Explain silicon as substrate material for MEMS. 6
5. a) Explain MEMS design consideration in detail. 7
- b) Explain the introduction of scaling with examples. 6

**OR**

6. a) Explain the scaling in Geometry with example. 7
- b) Explain scaling in electrostatic forces. 6
7. a) Explain physical vapor Deposition (PVD) process in detail. 6
- b) Explain the following term, 7
  - i) Diffusion
  - ii) Oxidation.

**OR**

8. a) Explain PECVD and APCVD with neat sketches. 6  
b) Explain the following term, 7  
i) Light sources.  
ii) Photoresist.
9. a) Differentiate dry etching and wet etching in bulk micro machining. 7  
b) Explain the following terms related to etching. 6  
i) Isotropic  
ii) Anisotropic
- OR**
10. What is meant by packaging? What are the special requirements for packaging material? Which material is used for packaging? 13
11. a) Explain the working principle of thermal sensor. 7  
b) Explain the working of optical sensors 7
- OR**
12. a) Explain following terms related to micro actuation, 5  
i) Actuation using thermal forces  
ii) Piezoelectric crystals.  
b) Explain working principle of microgears, micropumps and micromotors. 9

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