

**B.Tech. SEM -VI Bio Medical 2014 Course (CBCS) : SUMMER - 2019**  
**SUBJECT: BIO MEMS**

Day: Friday  
Date: 24/05/2019

**S-2019-2773**

Time: 02.30 PM TO 05.30 PM  
Max. Marks: 60

**N.B.:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.

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**Q.1** Define MEMS and microsystem and explain applications of MEMS technology. Explain scaling laws in miniaturization with the help of following terms: [10]

- i) Scaling in geometry
- ii) Heat transfer

**OR**

**Q.1 a)** What do mean by actuator? Also explain following mechanical concepts: [06]

- i) Stress
- ii) Strain
- iii) Beam and cantilever.

**b)** Write a note on scaling in force and electricity. [04]

**Q.2** Define substrate and wafer. Also describe in detail materials used for MEMS. [10]

**OR**

**Q.2 a)** Explain in detail system for biotechnology and PCR. [05]

**b)** Explain in details following materials used for MEMS. [05]

- i) Quartz
- ii) Polymer

**Q.3** Explain in detail miniature biosensor and biosensor array. [10]

**OR**

**Q.3 a)** With the help of schematic explain thermal sensing and actuation. [05]

**b)** Write a note on: [05]

- i) Microsurgical tools
- ii) Optical biosensors

**Q.4** What is LIGA? Explain in detail working of LIGA technology. [10]

**OR**

**Q.4** Explain in detail procedure for bulk micromachining. Also give the major difference between bulk and surface micromachining. [10]

**Q.5** What is importance of MEMS packaging? Explain with diagram overview of packaging of microelectronics. [10]

**OR**

**Q.5** Explain in detail packing design. [10]

**Q.6** Write short note on: [10]

- i) MATLAB
- ii) AutoCAD
- iii) Spice
- iv) Solid works
- v) Ansysmultiphysics

**OR**

**Q.6** Explain in detail methodologies for MEMS. [10]

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