

(3 Hours)

(Total Marks: 80)

**Please check whether you have the right question paper.**

- N.B.:**
- 1) Question No.1 is compulsory.
  - 2) Answer any Three out of remaining five questions
  - 3) Draw the neat diagrams wherever necessary.

**Q1.**

- A] What is MEMS? Give two examples of MEMS devices which are characterized by sensors and actuators. **5**
- B] What are polymers? Discuss its role in MEMS fabrication. **5**
- C] Explain the steps in standard RCA cycle, during wafer cleaning. **5**
- D] Explain packaging challenges in MEMS devices. **5**

**Q2.**

- A] What are different silicon compounds. Explain their characteristics and uses in MEMS device fabrication. **10**
- B] State various physical vapor deposition techniques. Explain in brief any one technique of PVD in MEMS fabrication. **10**

**Q3.**

- A] Explain the process of photolithography in detail. **10**
- B] Distinguish between Wet and Dry etching process with suitable applications. **10**

**Q4.**

- A] Describe the representative process flow for fabricating the cantilever structure. **10**
- B] Define reliability in MEMS devices. Explain it using bath-tub-curve. **10**

**Q5.**

- A] Explain in detail, fabrication steps for MEMS microheater. **10**
- B] Differentiate between surface and bulk micromachining with suitable examples. **10**

**Q6. Write short note on: **20****

- A] MEMS sensors in IoT applications.
- B] Selection of MEMS material based on applications.
- C] Wafer bonding techniques.
- D] MEMS device characteristics.