**Time: 3 Hours** **Marks: 80**

**Note:1) Question No 1 is Compulsory.**
**2) Answer any three from the remaining questions.**
**3)Assume suitable data wherever required**

Q1. Solve any four of the following (20)

a. Explain the role of MEMS sensors in IoT
b. Explain the sacrificial layer and its role in the fabrication of MEMS devices
c. Explain the principle of the Digital Mirror device
d. Define piezoresistivity and list out all piezo-resistive coefficient
e. Compare wet and Dry etching techniques

Q2.a How MEMS pressure sensor convert pressure into equivalent electrical parameter, explain with its schematic representation and fabrication process steps (10)

b. Define Reliability. Draw and explain the bath-tub-curve describing the MEMS device's reliability (10)

Q3.a What are Polymers? Draw the role of SU8 and PMMA polymers in MEMS application (10)

b. Describe the representative process flow for fabricating the cantilever structure (10)

Q4.a Describe the DRIE process. How can DRIE achieve virtually perfect vertical etching? (10)

b. Differentiate between bulk and surface micromachining for fabrication of MEMS device with suitable example (10)

Q5.a List types of lithography. Explain in detail X-ray lithography and its major features (10)

b. Describe the process flow for fabricating a microheater. Also, explain its working principle. (10)

Q6. Write a Short note on (20)

a. Wafer bonding techniques
b. MEMS Sensor in Biomedical Applications
c. Annealing
d. Micro Actuation Techniques