

**M.Tech. (I.E.E) Examination, 2019**

(2 nd. Semester)

**MEMS SENSORS AND ACTUATORS**

Time: Three hours

Full Marks: 100

Answer any *four* questions.

All questions carry *equal* marks.

1. What are the different steps of the photolithographic process? Discuss various steps in Mask fabrication, Pattern transfer and Resists Process.
2. Discuss various types of etching process in view of Micromachining in MEMS Technology. How would you fabricate a poly Silicon free standing beam that rests on the surface of Silicon wafer but is raised over it by a Silicon nitride-insulating step?
3. With the help of neat diagram describe the principle of operation of vacuum evaporation and sputtering techniques used for the metallization process in a MEMS device.
4. Discuss with illustration the different stages of Thin Film Process for MEMS Sensor preparation.
5. With the help of neat sketch describe the principles of operation of two thermal and two mechanical micro sensors.
6. Discuss the basic principle of a resistive MOS gas sensor and hence derive the process flow of a silicon resistive gas sensor based on a micro hotplate.