

VL 5091 MEMS and NEMS

Important 13 Marks Questions

Unit I

1. Compare microelectronics with microsystems.
2. Explain the important properties of polymers as industrial materials and discuss polymers as a substrate materials for MEMS and microsystems.
3. Elaborate any one application of MEMS and Microsystems.
4. Summarize briefly on the three principal silicon compounds used in MEMS and Microsystems.
5. Discuss in detail the MEMS fabrication processes.

Unit II

1. Discuss the process of Photolithography using suitable sketches and discuss the application of photoresists.
2. Explain the working principle of plasma etching and Deep reactive Ion Etching using suitable sketches.
3. With neat diagram explain two types of capacitive electrode configuration.
4. With neat diagram explain the floating element shear stress sensor.
5. With schematic diagram explain bulk micro machined parallel plate capacitor serving as a differential mode tactile sensor.

Unit III

1. Elaborate about the working principle for acoustic wave sensors with a neat sketch.
2. Discuss briefly working principle of micro pressure sensors and explain its types with a neat sketches.
3. Differentiate between bulk and surface micro machining. Explain the role of sacrificial layer in fabrication of MEMS devices.
4. Draw and explain working principle of cantilever. Show basic quantitative behaviour of cantilever. Also discuss process steps for fabrication of cantilever.
5. List the properties and applications of piezoelectric materials.

Unit IV

1. Discuss briefly on actuation using thermal forces, and Piezoelectric Crystals using a suitable sketches.
2. Elaborate the applications of Micro actuations in micro motors and micro pumps using a suitable sketches.
3. State various deposition techniques. Explain in brief the technique of PVD for MEMS device Fabrication. Also define step coverage and shadowing.
4. List types of lithography. Explain in detail X-ray lithography with its major features.
5. With neat diagrams explain the different etching processes in detail.

Unit V

1. Discuss the schrodinger equation for nonrelativistic quantum mechanics and potential energy function in schrodinger equation.
2. Explain briefly on molecular wires and its synthesis and its types.
3. Explain operating principle of pressure sensor, Describe the representation process flow for fabricating pressure sensors.
4. Describe in detail inkjet printer head and its fabrication process flow in detail.
5. Classify about optical MEMS and its applications.