

17VL014 MEMS

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
45	15	-	15	30	-	5	5	-

Course Objectives:

- This course is an introduction to Micro Electro Mechanical Systems and is intended for Post Graduate students.
- Silicon-based integrated MEMS promise reliable performance, miniaturization and low-cost production of sensors and actuator systems with broad applications in data storage, biomedical systems, inertial navigation, micromanipulation, optical display and micro fluid jet systems.
- The course covers such subjects as materials properties, fabrication techniques, Mechanical sensor packaging, mechanical transduction techniques, pressure sensors, Force, torque and internal sensors.

Course Outcomes:

Upon successful completion of this course student should be able to:

- An introduction to microsensors and actuators and different applications in MEMS.
- Different micromachining technologies in MEMS
- Introduction on micromachined microsensors and their different types
- MEMS Simulators and different FEA tools
- Bonding and Packaging of MEMS

SKILLS:

- Understand future applications of MEMS.
 - Be able to apply all these skills to the design of a MEMS system.
- The above can be applied to understand the design and fabrication of MEMS

UNIT - I

An introduction to Micro sensors and MEMS, Evolution of Micro sensors & MEMS, Micro sensors & MEMS applications.

UNIT - II

Microelectronic technologies for MEMS, Micromachining Technology, Surface and Bulk Micromachining, working principle of various MEMS.

UNIT - III

Micro machined Micro sensors: Mechanical, Inertial, Biological, Chemical, Acoustic, Microsystems Technology, Integrated Smart Sensors and MEMS.

UNIT - IV

Interface Electronics for MEMS, MEMS Simulators, MEMS for RF Applications, Bonding & Packaging of MEMS, Conclusions & Future Trends.

UNIT - V

Polymer Mems Polymers in MEMS– Polimide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon - Application to Acceleration, Pressure, Flow and Tactile sensors.

TEXT BOOKS

1. Tai-ran Su, MEMS and Microsystems: design and Manufacture, Tata McGraw Hill.
2. S.K. Gandhi, VLSI Fabrication Principles, John Wiley Inc., New York, 1983.

REFERENCE BOOKS

1. S.M. Sze (Ed), VLSI Technology, McGraw Hill, 1988.
2. Chang Liu, 'Foundations of MEMS', Pearson Education Inc., 2006.

ACTIVITIES:

- o Design and Simulation of Inertia Sensors.
- o Design and Simulation of Pressure Sensors.
- o Design and Simulation of Electrostatic Actuators.
- o Design and Simulation of Piezo resistive Actuators.