

COURSE CODE	COURSE TITLE	L	T	P	C
1154AE114	Micro Electro Mechanical Systems	3	0	0	3

UNIT I FOUNDATION IN MICROSYSTEMS

9

Review of microelectronics manufacture and introduction to MEMS- Overview of micro systemstechnology, Laws of scaling- The multi-disciplinary nature of MEMS- Survey of materials central tomicro engineering- Applications of MEMS in various industries

UNIT II MICRO MANUFACTURING TECHNIQUES

9

Photolithography - Film deposition, Etching Processes - Bulk micro machining, silicon surface micro machining - LIGA process-Rapid micro product development.

UNIT III MICRO SENSORS

9

Introduction, Micro-sensor measurement principle, Micro-sensor fabrication techniques, modeling, Micro pressure sensors, Micro accelerometer, sensors, Micro thermal sensors, Micro floorsensors, Micro chemical sensors, Micro optical sensors, Micro sensor for humidity and displacement,application of micro sensors.

UNIT IV MICRO ACTUATORS

9

Introduction, classification of micro actuators, electro static, optical micro – actuators Energyconversion and force generation-Electromagnetic Actuators, Reluctance motors, piezoelectric actuators,bi-metal-actuator Friction and wear -Transducer principles

UNIT VINTRODUCTION TO MICRO/NANO FLUIDS

9

Fundamentals of micro fluidics- Micro pump – introduction – Types - Mechanical Micro pump – Non-mechanical micro pumps, Actuating Principles, Design rules for micro pump – modeling andsimulation, Verification and testing -Applications

Total Periods: 45

REFERENCES:

- 1.Tai Ran Hsu, “MEMS and Microsystems: Design, Manufacture, and Nanoscale Engineering”, John Wiley & Sons. Second edition, 2008.
- 2.Maluf, Nadim “An introduction to Micro Electro-mechanical Systems Engineering” AR Tech house, Boston 2000.
3. Chang Liu, “Foundations of MEMS”, Pearson publications, 2012.