

PEI7J005                      MICRO-ELECTRO-MECHANICAL SYSTEMS (MEMS) 3-0-0

Module-I (14 Lectures )

Overview of MEMS and Microsystems.(Chapter 1 of Text Book 1)

Micromachining Techniques:Silicon as material for micromachining, Photolithography, thin film deposition, doping,wet and dry etching, surface and bulk micromachining, Wafer bonding,LIGA packaging. (Chapter 3 and Section 8.2 of Text Book 1, Chapter 2 of Text Book 2)

Module II (10 lectures )

Microsystem Modeling and Design:Mechanics of deformable bodies, Energy method, Estimation of stiffness and damping for different micro-structures, Modeling of electromechanical systems, Pull-in voltage. (Section 4.1 to 4.3 and 6.2.2 of Text Book 1, Section 3.4 of Text Book 2)

Module III (15 Lectures )

MEMS Applications:Mechanical sensors and actuators: Piezoresistive pressure sensors, MEMS capacitive accelerometer, Gyroscopes, (Section 8.3 of Text Book 1 and Section 5.3 and 5.11 of Text Book 2)

Optical:Micro-lens, Micro-mirror, Optical switch(Section 7.5 to 7.7 of Text Book 2) Radio frequency MEMS:Inductor, Varactor, Filter, Resonator. (Section 9.3 to 9.7 of Text Book 2) Microfluidics:Capillary action, Micropumping, Electrowetting, Lab-on-a-chip. (Section 10.1 to 10.8 of Text Book 2)

Text Books:

1. G.K. Ananthuresh, K.J. Vinoy, S. Gopalakrishnan, K.N. Bhat and V.K. Atre: Micro and Smart Systems, Wiley India, New Delhi, 2010.
2. N.P. Mahalik: MEMS, Tata McGraw-Hill, New Delhi, 2007.

Reference Book:

1. T. Hsu: MEMS and Microsystems: Design and Manufacture, Tata McGraw-Hill, New Delhi, 2002.
2. Gabriel M.Rebeiz: RF MEMS Theory,design&Technology,Wiley India Education,2010.