PME8J002   MECHATRONICS AND MICRO ELCTRO MECHANICAL SYSTEMS

MODULE 1 (10 HOURS)
Evolution of Mechatronics, components of mechatronic system, types of mechatronic products, Signal theory, signal analysis and processing. Basic electronics devices: junction diodes, Bipolar transistors Basic Digital Technology: Digital number system, Binary number system, Hexadecimal number system, Binary addition, Boolean Algebra, Logic function, Universal GATES, FLIP-FLOP, Registers counters.

MODULE II (10 HOURS)
System modeling: Frequency response, Mechanical system, electrical system, Thermal system, Fluid system. Actuators- Electric motors; D.C. Motors, Stepper motor, , Hydraulic actuators, Pneumatic actuators Transducer and Sensors : Principles, difference between transducer and sensors, transducer types – photo emissive, photo conductive, photovoltaic, thermistors, Thermocouple, Inductive, capacitive, Peizoelectric,

MODULE III (10 HOURS)
Overview of MEMS and Microsystems. Micromachining Techniques: Silicon as material for micromachining, Photolithography, thin film deposition, doping, wet and dry etching, surface and bulk micromachining, Wafer bonding, packaging.

MODULE IV (10 HOURS)
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. MEMS Applications: Mechanical sensors and actuators: Piezoresistive pressure sensors, MEMS capacitive accelerometer, Gyroscopes, Piezoelectric actuators.

TEXT BOOKS

1. A Text Books of Mechatronics, R.K.Rajput, S.Chand& company
2. Mechatronics, N.G. P.C Mahalik, Tata McGraw Hill
3. Micro and Smart Systems, G.K. Ananthsuresh, K.J. Vinoy, S. Gopalakrishnan, K.N. Bhat and V.K. Atre, Wiley India, New Delhi, 2010.
4. N.P. Mahalik: MEMS, Tata McGraw-Hill, New Delhi, 2007.

REFERENCE BOOKS:
1. 3. Mechatronics, D.G. Alciator, M.B. Histand, Tata McGraw Hill
2. Mechatronics, A.Smaili& F Mrad, Oxford University Press
3. Mechatronics, K.P.ramchandran, G,K Vijay Raghavan, M. S Balachandran
4. Mechatronics AnIntigrated approach, Clarence W de Sliva, CRC Press
5. T. Hsu: MEMS and Microsystems: Design and Manufacture, Tata McGraw-Hill, New Delhi, 2002.