MECHATRONICS
(Elective - I)

Subject Code: 13ME2106

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Pre requisites: Mechanical Measurements

Course Educational Objectives:

To make the student understand

1. fundamentals of mechatronics
2. various sensors, actuators used and their applications to mechatronic systems
3. modelling and simulation of physical systems
4. controllers used in electro-mechanical systems
5. integration of various elements in the mechanical, electrical and control systems engineering

Course Outcomes:

The student will be able to

1. identify and explain various elements of a mechatronics system
2. model and simulate simple physical systems
3. suggest appropriate sensors and actuators for an engineering application
4. write simple microcontroller programs
5. build simple homemade projects using electronic devices integrating with mechanical systems

UNIT-I

Mechatronics system design: Introduction, integrated design issues in mechatronics, key elements, the mechatronics design process, advanced approaches in mechatronics

Modelling and simulation of physical systems: simulation and block diagrams, analogies and impedance diagrams, electrical systems, mechanical translational systems, mechanical rotational systems, electro mechanical coupling, fluid systems

UNIT-II

Sensors and transducers: An introduction to sensors and transducers, sensors for motion and position measurement, force, torque and tactile sensors, flow sensors, temperature-sensing devices

Actuating devices: DC and AC drives – servo motors and stepper motor – hydraulic and pneumatic drives – piezoelectric and magnetostrictive actuators – micro actuators

UNIT-III

Microcontroller programming: Microcontrollers, The PIC16F84 microcontroller, programming PIC, PicBasic programming fundamentals, examples, Use of Interrupts

UNIT-IV

Signals, systems and controls: Introduction to signals, systems and controls, system representation, linearization of nonlinear systems, time delays

Real time interfacing: Introduction, elements of a data acquisition and control system, overview of the I/O process, installation of the I/O card and software

UNIT-V

Advanced applications in mechatronics: Sensors for condition monitoring, mechatronic control in automated manufacturing, artificial intelligence in mechatronics, micro sensors in mechatronics

TEXT BOOK:

1. Bolton W., "*Mechatronics – Electronics Control Systems in Mechanical and Electrical Engineering*", 3e, Pearson Education Press, 2005.

REFERENCES:

1. Histand B.H. and Alciatore D.G., "*Introduction to Mechatronics and Measurement Systems*", 3rd edition ,Tata McGraw Hill Publishing Company Ltd, 2007.
2. R.K. Rajput, "*A text book of Mechatronics*", 1st edition, S. Chand and Company Ltd., 2007.