MECHATRONICS

(Elective - I)

Course Code: 15ME2106

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Course Outcomes: At the end of the course, the student will be able to

CO1: Develop a simulation model for simple physical systems and explain mechatronics design process

CO2: Outline appropriate sensors and actuators for an engineering application

CO3: Write simple microcontroller programs

CO4: Explain linearization of nonlinear systems and elements of data acquisition

CO5: Explain various applications of design of mechatronic systems

UNIT-I (10-Lectures)

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 (10-Lectures)

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 (10-Lectures)

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

UNIT-IV (10-Lectures)

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 (10-Lectures)

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.