

IAGE 316: Mechatronics System Design

(2 Credits: 50 Marks)

Course Outcomes:

On completion of the course, students should be able to –

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| 1 | Explain various mechanical elements of mechatronics |
| 2 | Discuss elements of mechatronics process design |
| 3 | Explain advanced control mechanisms in mechatronics |

Course Contents:

Module - I: Introduction

(05 Hrs)

Introduction to mechatronics systems. Basic building blocks of mechatronic systems. Mechatronics key elements, Mechatronics in industry automation, Scope of Mechatronics. Advantages of Mechatronics

Module - II: Machines in Mechatronics

(07 Hrs)

Physical translation and rotational systems, Fluid systems, guideways, Mechanism used in mechatronics (High resolution scanning mechanisms, Indexing mechanisms), Assembly techniques, Hydraulic and pneumatic actuators, microactuators. Piezoelectric actuators

Module - III: Mechatronics Design Process

(07 Hrs)

Generalized Mechatronics Design Process: Recognition of the Need, Conceptual Design and Functional Specification, First principle Modular Mathematical Modeling, Sensor and Actuator Selection, Drivers for Actuators, Detailed Modular Mathematical Modeling, Control System Design, Design Optimization, Prototyping Hardware-in-the-loop Simulation, Deployment/Life Cycle, Deployment of Embedded Software, Life Cycle Optimization.

Module -IV: Advance Approaches in Mechatronics

(05 Hrs)

Advance Approaches in Mechatronics: Servo control, Process Control, Supervisory Control, Shop Floor Control, Plant Control.

Module – V: Tutorials, assignments and presentation based on Module I to IV

References

1. Mechatronics, Kenji Uchino and Jayne R. Giniewicz, publication: Marcel Dekker, Inc.
2. Applied Mechatronics- A. Smaili and F. Mrad, OXFORD university press.
3. Mechatronics System Design , Shetty and Kolk CENGAGE Learning, India Edition
4. Introduction to Mechatronics and Measurement Systems , Alciatore and Histan Tata McGraw-Hill
5. Mechatronics, Neculescu, Pearson education.
6. Mechatronics - Electromechanics and Control Mechanics , Mill Springer-Verlag
7. Mechatronics - Electronic Control Systems in Mechanical Engineering , Bolton Pearson
8. Mechatronics - Electronics in products and processes , Bradley, et al. Chapman and Hall
9. Mechatronics - Mechanical System Interfacing , Auslander and Kempf, Prentice Hall
10. Introduction to Mechatronics, Appu Kuttan K.K., OXFORD Higher Education