

ME409 Mechatronics and Control										
L	T	P	Credit	Area		CWS	PRS	MTE	ETE	PRE
3	0/1	2/0	4	DEC/GEC		15/25	25	20/25	40/50	-

Objectives: To enable the students to understand the mechatronic systems and components, and simulation of dynamic systems. To understand Fundamentals of Stepper and servo motors and Digital logic.

Syllabus		Contact Hours
Unit-1	Introduction to mechatronic systems and components; Sensors and transducers; Actuators- electrical, electromechanical, electromagnetic, hydraulic, pneumatic, smart material actuators, micro actuators, nano actuators. Active actuators- piezoelectric, shape memory alloys (SMA), electro active polymers (EAP), magneto restrictive, magneto rheological fluid (MR).	8
Unit-2	Stepper and servo motors, Encoders and resolvers	6
Unit-3	Modeling, analysis and simulation of dynamic systems; use of MATLAB; Bode, Nyquist and root-locus plot	6
Unit-4	Feedback systems: Open and closed loop control systems; Stability and sensitivity; PID, phase lag and phase lead compensation	6
Unit-5	Sampled data systems and Digital controllers; DA/AD converters, microprocessors, interfacing with computers	8
Unit-6	Digital logic: Analysis and synthesis of mechatronic systems with application to robotics, CNC systems and others	8
	Total	42

Reference Book:	
1	Introduction to Mechatronics and Measurement systems, (special Indian edition), Alciatore, David Tata-McGraw Hill India Ltd.
2	Mechatronics: Principles, Concepts and applications, Mahalik.N, Tata-McGraw Hill India Ltd.
3	Mechatronics: Principles and applications, Onwubolu, Elsevier India Pvt Ltd.
4	Mechatronics by Hindustan Machine Tools Ltd., McGraw- Hill Ltd.
5	Mechatronics: Electronic Control systems in Mechanical and Electrical Engineering. 3/e, Pearson Education.
6	Dan Neculescu, "Mechatronics", Pearson Education Asia,2002(Indian reprint)
7	Mechatronics – W. Bolton, Pearson Education

Course Outcomes

CO1	Students will be able to know the basics, details and components of Mechatronic Systems.
CO2	Students will be able to know the principle of Sensors & Transducers and Pneumatic/Hydraulic/Mechanical/Electrical Actuation Systems.
CO3	Students will be able to understand the System Modelling, Analysis and Simulation of dynamic systems using Mechanical/Electrical/Thermal system building blocks.
CO4	Students will be able to know the various Feedback systems: PID controllers and phase lag and phase lead compensation.
CO5	Students will be able to understand the DA/AD converters, microprocessors, interfacing with computers,
CO6	Students will be able to know the Digital logic: Analysis and synthesis of mechatronic systems with application to robotics, CNC systems and others Advanced Applications in Mechatronics.

CO-PO/PSO Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	2	2	1	1	1	1	2	2	1	3
CO2	3	3	2	2	2	2	2	1	1	1	1	3	3	2	2
CO3	3	3	3	2	2	2	1	1	1	1	1	2	2	1	3
CO4	3	3	3	3	2	2	2	1	1	1	1	2	3	1	2
CO5	3	3	3	3	3	2	2	1	1	1	1	3	3	2	3
CO6	3	3	3	3	3	2	2	2	1	1	1	2	3	2	3