

Program Code:	ET201
Semester/Year:	Semester II / First Year
Course Name:	Mechatronics Applications in Manufacturing (Elective-II)
Course Code:	2ET2010206T
Pre-requisite Course:	Fundamentals of Instrumentation, Control and Electronics

Course Objective: To create knowledge in Mechatronics systems and impart the source of concepts and techniques, which have recently been applied in practical situations. It gives a framework of knowledge that allows engineers to develop an interdisciplinary understanding and integrated approach to engineering.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weight (%)
01	Introduction: Introduction to Mechatronics, need and applications, elements of Mechatronics systems, role of Mechatronics in automation, manufacturing and product development and applications.	3	12
02	Sensors And Transducers: Introduction-Importance of sensors in Mechatronics, Static and Dynamic characteristics of sensors-Performance Terminology- Displacement, Position and Proximity- Velocity and Motion - Fluid pressure - Temperature sensors- -Light sensors -Selection of sensors- Signal processing –Servo systems.	7	28
03	Hydraulic System: Actuators, Hydraulic Cylinders and their types, Hydraulic Motors and their types, Valves and their types, symbols for Hydraulic System Components, general hydraulic circuit, different types of hydraulic circuits and hydrostatic transmission.	4	16
04	Pneumatic Systems: Introduction to pneumatics, gas laws, compressed air generation and contamination control, pneumatic actuators, valves and control circuits, multiple-actuators circuits, pneumatic applications, maintenance, trouble Shooting and safety.	4	16
05	Computational Elements and Controllers: Basic concepts of control systems, open loop, closed loop, semi closed loop control system, block and functional diagrams controllers for robotics and CNC, linear and rotary encoders, timers, counters, microprocessors and microcontrollers: architecture and pin details, introduction to PLC, simple programs for process control application based on relay ladder logic- Supervisory Control and Data Acquisition Systems (SCADA) and Human Machine Interface (HMI).	7	28

Review Presentation: The student is expected to spend minimum 2 hours per week (as mentioned in the teaching and evaluation scheme) to refer at least two peer reviewed journal papers related to this domain/subject. The student is expected to identify issues/challenges and emerging trends in the domain/subject. Student is supposed to explore

various video lectures (E.g. NPTEL) available in the domain/subject Master of Technology (Semester II) view- presentation on the work carried out for the same.

First Year)

Recommended sites for journal papers are (1) asmedigitalcollection.asme.org (2) springer.com (3) sciencedirect.com (4) ieeexplore.ieee.org (5) scholar.google.co.in or others of similar repute.

List of References:

1. Introduction to Mechatronics Appu Kuttan K.K.Oxford University Press.
2. Mechatronics: Integrated Mechanical Electronic Systems Ramchandran K P, Vijayaraghavan Balasundaram, M S.Wiley India.
3. Measurement Systems Design and applications Doebelin E.O., McGraw Hill.
4. Mechatronics: Principle, Concepts and Applications Mahalik N.P. McGraw Hill.
5. Fundamentals of Programmable Logic Controllers, Sensors and Communications Jon Stenersons Prentice Hall, 2004.
6. Mechatronics Bolton W. Pearson Education.
7. Computer Control of Manufacturing Systems Yorem Koren McGraw Hill.
8. Introduction to Mechatronic Design J E Carryer, R M Ohline and T W Kenny Pearson.
9. Mechatronics- Ganesh S. Hegde, Published by Uni versity Science Press (An imprint of Laxmi Publication Private Limited).
10. Mechatronics by H.M.T., Ltd., Tata McGraw Hill Publication Co. Ltd.
11. Pneumatic Controls- Joji P, Wiley India Private Limited.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Students would understand be able to apply fundamentals of Mechatronics for various mechanical systems.	2 Understanding
CLO2	PLC control of sequencing circuit using PLC ladder diagram.	6 Creating 1 Remembering
CLO3	Students would be able to analyze hydraulic and pneumatic systems.	2 Understanding 4 Analyzing
CLO4	Students would understand the PLC and application of Mechatronics systems.	2 Understanding
CLO5	Develop pneumatic circuit for given application.	6 Creating 1 Remembering
CLO6	Integrate SCADA with PLC Systems.	6 Creating 5 Evaluating

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CLO1	H	M		M							L		H	
CLO2			H		M		L					L	M	
CLO3		M		H		L		L		M				H
CLO4	H				M				L				H	
CLO5		H	M				M				M			M
CLO6	M				H			M				M	H	

H: High, M: Medium, L: Low