

## INTRODUCTION TO MECHATRONICS

<b>Course Code</b>		<b>Year</b>	IV	<b>Semester</b>	I
<b>Course Category</b>	Open Elective-III	<b>Branch</b>	ME	<b>Course Type</b>	Theory
<b>Credits</b>	3	<b>L – T – P</b>	3 – 0 – 0	<b>Prerequisites</b>	Basic electrical and electronics
<b>Continuous Internal Evaluation</b>	30	<b>Semester End Evaluation</b>	70	<b>Total Marks</b>	100

**Course Outcomes:** Upon successful completion of the course, the student will be able to

	<b>Statement</b>	<b>Skill</b>	<b>BTL</b>	<b>Units</b>
<b>CO1</b>	<b>Understand and explain</b> the components of mechatronics systems and working principles of sensors and transducers.	Understand, Communication	L2	1
<b>CO2</b>	<b>Apply</b> electronic devices and signal conditioning techniques.	Apply, Communication	L3	2
<b>CO3</b>	<b>Explain and apply</b> the principles of hydraulic, pneumatic, and mechanical actuating systems.	Understand, Apply, Communication	L2-L3	3
<b>CO4</b>	<b>Illustrate and apply</b> basic logic control using microcontrollers and PLCs.	Understand, Apply, Communication	L2-L3	4
<b>CO5</b>	<b>Apply</b> data acquisition and interfacing techniques to basic mechatronic systems.	Apply, Communication	L3	5

**Contribution of Course outcomes towards achievement of Program outcomes & Strength of correlations (High:3, Medium: 2, Low:1)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
<b>CO1</b>	3	2	1	1	2					1		3	
<b>CO2</b>	3	3	2	2	3					1		3	
<b>CO3</b>	3	2	2	2	3					1		3	
<b>CO4</b>	3	3	3	2	3				2	2		3	2
<b>CO5</b>	3	3	3	3	3				2	2		3	3

<b>Syllabus</b>		
<b>UNIT</b>	<b>Contents</b>	<b>Mapped CO</b>
<b>I</b>	<b>MECHATRONICS SYSTEMS:</b> Elements & levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors.	<b>CO1</b>
<b>II</b>	<b>SOLID STATE ELECTRONIC DEVICES:</b> PN junction diode, BJT, FET, DIAC, TRIAC and LEDs. Analog signal conditioning, operational amplifiers, noise reduction, filtering	<b>CO2</b>

<b>III</b>	<b>HYDRAULIC AND PNEUMATIC ACTUATING SYSTEMS:</b> Fluid systems, Hydraulic systems, and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems. Mechanical actuating systems and electrical actuating systems – basic principles and elements.	<b>CO3</b>
<b>IV</b>	<b>DIGITAL ELECTRONICS AND SYSTEMS:</b> Digital logic control, microprocessors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control.	<b>CO4</b>
<b>V</b>	<b>SYSTEM AND INTERFACING AND DATA ACQUISITION:</b> Data Acquisition Systems, Analog to Digital and Digital to Analog conversions; Digital Signal Processing – data flow in DSPs, block diagrams, typical layouts, Interfacing motor drives. Design of mechatronics systems & future trends.	<b>CO5</b>

### Learning Resource

#### Text books:

1. MECHATRONICS Integrated Mechanical Electronics Systems/KP Ramachandran, GK Vijaya Raghavan & MS Balasundaram/WILEY India Edition
2. Mechatronics Electronic Control Systems in Mechanical and Electrical Engineering, (3rd edition), by W Bolton, Pearson Education Press, 2005.

#### Reference books

1. Mechatronics /Smaili A, Mrad F/ Oxford Higher Education, Oxford University Press
2. Mechatronics Source Book / Newton C Braga/Thomson Publications, Chennai.
3. Mechatronics – N. Shanmugam / Anuradha Agencies Publishers.
4. Mechatronics/M.D.Singh/ J.G.Joshi/PHI.
5. Mechatronics – Electronic Control Systems in Mechanical and Electrical Engg. 4th Edition / W. Bolton/ Pearson,2012
6. Mechatronics – Principles and Application / Godfrey C. Onwubolu/Elsevier, Indianprint

#### E-Resources & other digital Material:

1. [https://onlinecourses.nptel.ac.in/noc22\\_me54/course](https://onlinecourses.nptel.ac.in/noc22_me54/course)