MECHATRONICS

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

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

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

Syllabus		
UNIT	Contents	Mapped CO
I	**MECHATRONICS SYSTEMS**: 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.	CO1
II	**SOLID STATE ELECTRONIC DEVICES:** PN junction diode, BJT, FET, DIAC, TRIAC and LEDs. Analog signal conditioning, operational amplifiers, noise reduction, filtering	CO2

III	**HYDRAULIC AND PNEUMATIC ACTUATING SYSTEMS:** 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.	**CO3**
IV	**DIGITAL ELECTRONICS AND SYSTEMS:** Digital logic control, microprocessors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control.	**CO4**
V	**SYSTEM AND INTERFACING AND DATA ACQUISITION:** 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.	**CO5**

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