MECHATRONICS
Open Elective-IV

	Statement	BTL	Units

Course Code	20ME2702A	**Year**	IV	**Semester**	I
Course Category	Open Elective-4	**Offering 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

CO1	Explain the concepts related to elements of Mechatronic systems.	L2	1,2,3,4,5
CO2	Summarize the construction and working of sensors used in building mechatronic systems.	L3	1
CO3	Illustrate various types of actuation systems and their components.	L3	2
CO4	Develop mathematical models using building blocks and make use of these models to find the dynamic response.	L3	3
CO5	Summarize the construction and working of closed loop controllers, Micro processor and Microcontrollers.	L3	4
CO6	Illustrate the features and applications of digital logic, PLC and of Fuzzy logic.	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	PO12	PSO1	PSO2
CO1	3									2		2		
CO2	3									2		2		
CO3	3		3							2		2		
CO4	3	3			2					2		2		
CO5	3				2					2		2		
CO6	3				2					2		2		

Syllabus		
UNIT	**Contents**	**Mapped CO**
I	**INTRODUCTION:** Definition of Mechatronics, evolution of mechatronics, systems, measurement systems, control systems, mechatronic design process, traditional design and mechatronic design, applications of mechatronic systems, advantages and disadvantages of mechatronic systems. **SENSORS:** classification of sensors, basic working principles, Velocity sensors – Proximity and Range sensors, ultrasonic sensor, laser interferometer transducer, Hall Effect sensor, inductive proximity switch. Light sensors – Photodiodes, phototransistors, tactile sensors –PVDF tactile sensor, micro-switch and reed switch, Piezoelectric sensors, vision sensor	**CO1 CO2**
II	**PNEUMATICAND HYDRAULIC ACTUATION SYSTEMS:** Actuation systems, Pneumatic and Hydraulic systems- constructional details of filter, lubricator, regulator,	**CO1 CO3**

	direction control valves, pressure control valves, flow control valves, actuators-linear and rotary. **ELECTRICAL ACTUATION SYSTEMS**: Electrical systems, Mechanical switches, solid state switches, solenoids, DC motors, AC motors, stepper motors. Characteristics of pneumatic, hydraulic, electrical actuators and their limitations.	
III	**BASIC SYSTEM MODELS:** Mathematical models, mechanical system building blocks, electric system building blocks, fluid system building blocks, thermal system building blocks. **DYNAMIC RESPONSES OF SYSTEMS:** Transfer function, Modelling dynamic systems, first order and second order systems.	**CO1** **CO4**
IV	**CLOSED LOOP CONTROLLERS:** Classification of control systems, feedback, closed loop and open loop systems, continuous and discrete processes, control modes, two step mode, proportional mode, derivative control, integral control, PID controller. **MICROPROCESSOR AND MICRO CONTROLLER:** Introduction, Architecture of a microprocessor (8085), Architecture of a Micro controller, Difference between microprocessor and a microcontroller.	**CO1** **CO5**
V	**DIGITAL LOGIC:** Digital logic, number systems, logic gates, Boolean algebra, Karnaugh maps, application of logic gates, sequential logic, transducer Signal Conditioning and devices for data conversion. **PROGRAMMABLE LOGIC CONTROLLERS :**Introduction, basic structure, input/output processing, programming, mnemonics, timers, internal relays and counters, shiftregister,masterandjumpcontrols.Datahandling,Analoginput/output,selectionofaPLC. **FUZZY LOGIC APPLICATIONS IN MECHATRONICS**: Fuzzy logic systems, Fuzzy control, Uses of Fuzzy expert systems.	**CO1** **CO6**

Learning Resource
Text books:
1. Mechatronics Electronic Control Systems in Mechanical and Electrical Engineering, (3rdedition), by WBolton, Pearson Education Press, 2005. 2. Mechatronics System Design, 5th Indian reprint, 2009, by Devdas shetty, Richard A.kolk, PWS Publishing Company
Reference books
1. Mechatronics Sou rce Book, by Newton C Braga, Thomson Publications, Chennai. 2. Mechatronics, by N. Shanmugam, Anuradha Agencies Publishers. 3. Control sensors and actuators, by C. W. Desilva, Prentice Hall. 4. Design with Micro processors for Mechanical Engineers, by Stiffler, A. K. McGraw-Hill(1992).
E-Resources & other digital Material:
1. https://onlinecourses.nptel.ac.in/noc22_me54/course