

MECHATRONICS LAB

Course Code	23SA8753	Year	IV	Semester	I
Course Category	Skill Advanced course	Branch	ME	Course Type	Lab
Credits	2	L – T – P	0 – 1 – 2	Prerequisites:	Nil
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	Expts
CO1	Understand and analyze the behavior of various sensors used in mechatronic systems.	Apply	L3	1-4
CO2	Design and implement PLC programs using ladder logic for industrial automation applications.	Apply	L3	5-10
CO3	Design, simulate, and analyze hydraulic and pneumatic systems using Automation Studio.	Apply	L3	11-15
CO4	Develop MATLAB/Simulink models to simulate logic circuits and control systems.	Apply	L3	17-18
CO5	Design and construct pneumatic and electro-pneumatic circuits for industrial applications.	Apply	L3	19-20

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	3				2	2		2	1
CO2	3	2	3	2	3				3	2	1	3	2
CO3	3	2	3	3	3				2	2	1	3	2
CO4	3	2	2	2	3				2	2		2	2
CO5	3	2	3	2	3				3	2	2	3	3

Note: Twelve experiments must be conducted

LIST OF EXPERIMENTS

Syllabus		
Exp. No.	Content	Mapped CO
1. BEHAVIOUR OF SENSORS (SENSOR KIT)		
1. Behavior of Inductive sensor NJ 2. Behavior of Capacitive sensor CJ 3. Behavior of Magnetic sensor MJ 4. Behavior of Ultrasonic sensor		CO1
2. PLC PROGRAMMING (LADDER PROGRAMMING)		
5. Ladder programming on Logic gates ,Timers (TON,TOFF) &counters (UP,DOWN) 6. Ladder Programming for digital &Analog sensors 7. Ladder programming & Simulations of Virtual System such as Traffic Light control, Washing machine, Garage Door, Water level control, Lift control, Conveyor Belt etc. 8. Ladder programming to control circuits such as single solenoid spring return latch circuit, double solenoid Hydraulic / Pneumatic circuits, Self-Reciprocating Hydraulic / Pneumatic Circuit. 9. PLC Program to Operate 4 Outputs Simultaneously with Time Delay 10. PLC Program to do Mathematical Functions		CO2

3. AUTOMATION STUDIO SOFTWARE (Design, Simulate & Analyze)		
11. Introduction to Automation studio & its control. 12. Draw & Simulate Hydraulic circuits for series & parallel cylinders connection, Accumulator circuit, Pressure intensifier circuit, Simple Electro- Hydraulic Electro - Pneumatic circuits (Plot Waveforms for different parameters). 11. Design & Simulate Meter-in, Meter-out, Regenerative circuit, sequencing circuit, traverse and feed hydraulic circuit, hydraulic press and clamping. 12. Modeling and simulation of single cycle operation of a double acting cylinder using limit switch 13. Modeling and simulation of multi cycle operation of a double acting cylinder using limit. 14. Position Control of Proportional Servo Valve Circuit using PID Feedback controller.		CO3
4. MATLAB PROGRAMMING		
17. Sample programmes on MATLAB to verify truth tables of a) NOT b) AND c) NAND d) OR e) NOR f) XOR g) XNOR logic gates 18. Simulation and analysis of PID controller using SIMULINK		CO4
5. PNEUMATICS & ELECTRO PNEUMATICS		
19	Direct & Indirect control of single and double acting cylinders.	CO5
20	Direct control & Indirect control of a double acting cylinder using a solenoid valve and relays.	