Reg. No. | | | | | | | | | | | |

B.E / B.TECH. DEGREE EXAMINATIONS, MAY 2023
Seventh Semester
ME18703 – MECHATRONICS
(Mechanical Engineering)
(Regulation 2018)

TIME: 3 HOURS   **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	The students will illustrate and understand the basic concepts of Mechatronics system and its constituent systems such as measurement system, control systems and various sensors and transducers involved in mechatronics system design	2
CO 2	The students will be able to develop the programming for microprocessor and microcontroller which they can be implemented in mechatronic system design	3
CO 3	The students will able to interface the various modules involved in mechatronics system design	4
CO 4	The students will able to write the programs to automate any manufacturing process using PLC	4
CO 5	The students will be able to design a mechatronics system for a given application using mechatronics approach.	5

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Distinguish between a control system and a mechatronics system.	1	2
2.	What is the step angle of a permanent-magnet stepper motor having 8 stator poles and 4 rotor poles?	1	4
3.	State the need of temporary register in 8085 microprocessor.	2	2
4.	What is the function of ALE pin in a microprocessor?	2	2
5.	State the purpose of PLC input latching.	3	2
6.	Create a ladder diagram for Cascaded timers.	3	3
7.	Identify the key stages in mechatronics system design.	4	3
8.	State the role VI software in data acquisition process.	4	2
9.	List any four applications of AI implemented in Mechatronics.	5	2
10.	Name the electrical actuators used in a pick and place robot.	5	2

PART- B (5 x 14 = 70 Marks)

				Marks	CO	RBT LEVEL
11. (a)	(i)	Explain the working principle of resistance type potentiometer to control the speed of a motor with a neat sketch.		(7)	1	3

	(ii)	Recommend a load cell for a weighing machine and explain its working with a neat diagram.	(7)	1	3
		(OR)			
(b)	(i)	Identify the various characteristics of sensors and explain them in brief.	(7)	1	3
	(ii)	Suggest a suitable motor for a wind screen wiper system and explain its working with a neat sketch.	(7)	1	3

12. (a)		List the various functional blocks of 8085 microprocessor, connect them with power and data lines and show with a neat block diagram.	(14)	2	3
		(OR)			
(b)	(i)	Write a program with a flowchart to add two 8-bit numbers using 8085 instruction set.	(7)	2	3
	(ii)	Explain the functional description of various pins in 8255 PPI.	(7)	2	3

13. (a)	(i)	Explain a circuit that can be used to start a motor and then after a delay of 100s start a pump when the motor is switched off there should a delay of 10s before the pump is switched off.	(7)	3	2
	(ii)	Explain sourcing and sinking in PLC	(7)	3	2
		(OR)			
(b)	(i)	What is ladder programming? Write a ladder program to start/stop a motor using single push switch. Green LED glows when motor is ON and red LED glows when motor is OFF.	(7)	3	2
	(ii)	What are the criteria needs for the selection of a PLC?	(7)	3	2

14. (a)	(i)	Design a control system for automatic water level controller showing all the key elements with neat block diagram.	(7)	4	4
	(ii)	List the possible design solutions for bathroom scales and discuss any one in detail.	(7)	4	4
		(OR)			
(b)		Design a SCADA system when a more number of PLC's are used in a manufacturing plant with a neat block diagram.	(14)	4	4

15. (a)		Explain the role of fuzzy logic controller in a domestic washing machine with a neat sketch.	(14)	5	2
		(OR)			
(b)		Discuss in detail about the mechatronic design of an engine management system.	(14)	5	2

PART- C (1 x 10 = 10 Marks)
(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Provide a mechatronics solution for an automatic car park barrier system	(10)	5	4

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