0200MRT292062402

Reg No.:_

Name:

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech S4 (Hons.) Exam May 2025 (2023 Admn)

Course Code: MRT292

Course Name: MICRO MECHATRONIC SYSTEMS

Max. Marks: 100

Duration: 3 Hours

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		(Answer all questions; each question carries 3 marks)	Marks
1		Define MEMS. Mention some of the advantages of MEMS?	3
2		"Silicon is preferred over other materials for manufacturing of MEMS" Justify the	3
		statement.	
3		Illustrate 'MEMS as a micro actuator' with a neat block diagram	3
4		Explain the working principle of piezo electric crystals	3
5		Briefly explain about microvalves with application.	3
6		Explain the need for etching in micro manufacturing techniques.	3
7		Mention the various methods of micro machining	3
8		What is the standard clean room used for micro machining?	3
9		Briefly explain scaling in geometry?	3
10		Explain about applications of MEMS in Aerospace Industry.	3
		PART B (Answer one full question from each module, each question carries 14 marks)	
		Module -1	
11	a)	Explain about the advantages & application of Polymers used for MEMS	7
	b)	Explain about substrates and wafers used in the manufacturing of MEMS	7
12	a)	Differentiate between die level packaging and device level packaging. Explain with	14
		suitable diagram. List out the general considerations in packaging designs	
		Module -2	
13	a)	Discuss on the following microsensors with necessary figures	10
		a) Thermal sensors	
		b) pressure sensors	
	b)	Explain about actuation in MEMS using shape memory alloys.	4
14	a)	Explain about micro grippers and micro motors.	14
		Module -3	

PART A

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- a) Describe various types of vapour depositions done in micro manufacturing. 14
 Differentiate between physical vapour deposition and chemical vapour deposition.
- 16 a) Describe the process of bulk micro manufacturing. What is its significance 14 compared to surface micro manufacturing?

Module -4

- a) Describe the working principle, advantage, disadvantages and application of 14 ultrasonic micromachining
- a) Elaborate with a neat diagram the working principle and construction of electrical 14 discharge machining method. Mention its applications.

Module -5

- 19a) Describe in detail scaling in electrostatic and electro magnetic forces.14
- a) Explain in detail with examples the future of MEMS in the automotive & healthcare 14 industry.