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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN  
 [AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]  
 Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

**Question Paper Code: 120023**

B.E. / B.Tech DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025  
 Fifth Semester  
 Biomedical Engineering  
 U23BMV42 – MEDICAL SENSORS AND MEMS TECHNOLOGY  
 (Regulation 2023)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Give two examples of pressure sensors used in medical instrumentation.	2	K1	CO1
2.	Define smart sensors and mention one application.	2	K1	CO1
3.	List the interface circuits used for capacitive MEMS sensors.	2	K2	CO2
4.	Write the significance of a micro hot-plate device.	2	K2	CO2
5.	List any four important materials used in MEMS fabrication.	2	K1	CO3
6.	List the key steps in MEMS materials synthesis.	2	K2	CO3
7.	Differentiate surface and bulk micromachining.	2	K2	CO4
8.	Briefly explain the process of photolithography.	2	K2	CO4
9.	What is the Peltier effect? How is it used in microscale heat pumps?	2	K2	CO5
10.	Outline the working principle of micropumps.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	Describe the various flow measurement techniques used in medical applications.	13	K2	CO1

	(OR)			
	b) Illustrate how torque and vibration sensors can be applied in prosthetic or rehabilitation devices.	13	K2	CO1
12.	a) Discuss the role of dielectric materials in MEMS devices and analyze their influence on performance.	13	K3	CO2
	(OR)			
	b) Elaborate the basic steps involved in the design of a microsystem for sensing and control applications.	13	K3	CO2
13.	a) Compare and contrast wet and dry micromachining techniques in terms of precision and control.	13	K3	CO3
	(OR)			
	b) Describe how finite element modeling aids in MEMS material and system design.	13	K3	CO3
14.	a) Explain the concept of a clean room and discuss the different cleanroom classifications and their significance in the fabrication process.	13	K2	CO4
	(OR)			
	b) Explain the various types of deposition techniques used in microfabrication.	13	K2	CO4
15.	a) Explain the working principle of mechanical microsensors using beam and cantilever structures.	13	K3	CO5
	(OR)			
	b) With neat sketches, explain the design and operation of a microgripper and microlens.	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.	Questions	Marks	KL	CO
16.	a) Formulate a multi-sensor integration scheme for real-time stress monitoring using temperature and pulse sensors.	15	K2	CO1
	(OR)			
	b) How is the performance of microsensors and actuators tested using software tools? Justify with necessary examples.	15	K4	CO5