

Reg.No.:



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

Question Paper Code: 12011

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – MAY / JUNE 2024

Sixth Semester

Biomedical Engineering

U19BMV51 – BIO MEMS

(Regulation 2019)

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.	Why silicon is considered as the ideal substrate material for MEMS?	2	K2	CO1
2.	Distinguish between chemical and plasma etching.	2	K2	CO1
3.	Define Normal Stress. Mention its SI Unit.	2	K2	CO2
4.	Mention the significance of Young's Modulus.	2	K2	CO2
5.	List any three advantages of electrostatic sensing and actuation.	2	K2	CO3
6.	Write any two applications of Comb-drive devices.	2	K2	CO3
7.	Write the expression for Reynolds number.	2	K2	CO4
8.	State the SI unit of dynamic viscosity.	2	K2	CO4
9.	What is the principal advantage of CAD?	2	K2	CO5
10.	How does a prospective buyer should choose for a CAD package for MEMS?	2	K2	CO5

PART – B

Q.No.	Questions	(5 x 13 = 65 Marks)		
		Marks	KL	CO
11. a)	Distinguish between chemical vapor deposition and Physical vapor deposition. Also explain in detail about the working principle and chemical reaction involved in Chemical vapor deposition.	3+10	K2	CO1
	(OR)			
b)	With suitable illustration explain in detail about photolithography.	13	K2	CO1
12. a)	With neat sketches, describe the types of beam and explain the boundary conditions of beams.	13	K2	CO2
	(OR)			
b)	What are the four possible mechanisms for heat to move from one point to another? Explain in detail about thermal couples.	3+10	K2	CO2
13. a)	Explain in detail about the fabrication process of MEMS electrostatic pressure sensor with sealed cavity.	13	K2	CO3
	(OR)			
b)	Describe in detail about the applications of Piezoelectric sensors.	13	K2	CO3
14. a)	Elaborate in detail about micromachined valve.	13	K2	CO4
	(OR)			
b)	Explain the laminar fluid flow in circular conduits and identify the expression for hydraulic diameter.	13	K2	CO4
15. a)	Elucidate the general structure of CAD for microsystem product design.	13	K3	CO5
	(OR)			
b)	With suitable illustration explain in detail about DNA sensor.	13	K3	CO5

PART – C

Q.No.	Questions	(1 x 15 = 15 Marks)		
		Marks	KL	CO
16. a)	From device design considerations to product packaging, explain the materials, fabrications & processes involved in the development of a MEMS biosensor of your choice.	15	K3	CO5
	(OR)			
b)	With appropriate sketches and dimensions, propose the materials and design for a MEMS tactile sensor.	15	K3	CO3