

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VII (NEW) EXAMINATION – WINTER 2020****Subject Code:2170311****Date:30/01/2021****Subject Name:Biomedical Microsystems****Time:10:30 AM TO 12:30 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	(a) What are Miller indices?	03
	(b) Explain Sputtering in detail.	04
	(c) Explain PVD techniques used in MEMS technology.	07
Q.2	(a) Discuss various alternate materials used for manufacturing of MEMS.	03
	(b) Explain Plasma etching with neat diagram	04
	(c) Explain CVD technique used in manufacturing of MEMS.	07
Q.3	(a) Explain the effect of residual stress on MEMS device. Discuss the equation which is used to find residual stress.	03
	(b) Explain sacrificial surface micromachining. Mention the different sacrificial used with different structural materials.	04
	(c) Explain Wet etching with neat diagram.	07
Q.4	(a) Write and explain various CVD reactions.	03
	(b) Explain manufacturing of Silicon On Insulator (SOI) substrate with neat diagram.	04
	(c) Explain LIGA fabrication process.	07
Q.5	(a) Explain process of annealing in MEMS	03
	(b) Explain concept of electron tunneling.	04
	(c) Explain Lift off process with neat diagram.	07
Q.6	(a) Explain concept of diffusion used in material doping. Give equation which governs the diffusion process.	03
	(b) With neat diagram explain the process of Implantation used in doping process.	04
	(c) Explain Diagnostic and Therapeutic Applications of Metal Nano shells.	07
Q.7	(a) Explain current challenges in drug delivery and the remedies.	03
	(b) Write short note on Biosensors arrays and Implantable devices.	04
	(c) Explain Quantum dots usefulness as optical probes. Give one example.	07
Q.8	(a) Discuss materials which are used in drug delivery.	03
	(b) Give classification of physical sensors, Integrated, Intelligent or Smart sensors	04
	(c) With neat diagram explain any one MEMS actuator design.	07
