

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER– VII (New) EXAMINATION – WINTER 2019****Subject Code: 2170311****Date: 03/12/2019****Subject Name: Biomedical Microsystems****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
<b>Q.1</b>	(a) What is LIGA process?	<b>03</b>
	(b) How MEMS technology will be useful in various fields?	<b>04</b>
	(c) What is significance of Lift off process? Explain it in detail.	<b>07</b>
<b>Q.2</b>	(a) Define the terms: MEMS and Microelectronics.	<b>03</b>
	(b) List out different techniques used for Wafer bonding. Explain any one technique in detail.	<b>04</b>
	(c) Explain chemical mechanical polishing in fabrication of MEMS.	<b>07</b>
	<b>OR</b>	
	(c) Explain Bulk micromachining in detail.	<b>07</b>
<b>Q.3</b>	(a) Define Sensor Noise.	<b>03</b>
	(b) Explain Smart sensors.	<b>04</b>
	(c) Describe the process of plasma etching.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Define Electron Tunneling.	<b>03</b>
	(b) Explain Biosensors arrays in detail.	<b>04</b>
	(c) Describe the process of wet etching.	<b>07</b>
<b>Q.4</b>	(a) Explain Bio sensing Principles of Micro biosensor.	<b>03</b>
	(b) Explain MEMS Chemical Sensors.	<b>04</b>
	(c) Write a short note on the processes of Physical Vapor Deposition (PVD) with necessary diagrams.	<b>07</b>
	<b>OR</b>	
<b>Q.4</b>	(a) Explain Material Doping in fabrication process.	<b>03</b>
	(b) Explain the steps of packaging in detail.	<b>04</b>
	(c) Write a short note on the processes of Chemical Vapor Deposition (CVD) with necessary diagrams.	<b>07</b>
<b>Q.5</b>	(a) Explain Microsystems for Biological Imaging.	<b>03</b>
	(b) Define sacrificial layer and structural layers used in MEMS.	<b>04</b>
	(c) Explain different Diagnostic applications of Metal Nano shells.	<b>07</b>
	<b>OR</b>	
<b>Q.5</b>	(a) Explain MEMS Actuators.	<b>03</b>
	(b) Explain Classification of micro physical sensors.	<b>04</b>
	(c) Explain mechanism and working of micro devices for oral drug delivery system.	<b>07</b>

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