Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – VIII.EXAMINATION – WINTER 2016

Subject Code: 182008 **Date: 24/10/2016**

Subject Name: MEMS & Nano Technology (Department Elective - II)

Time: 02:30 PM to 05:00 PM **Total Marks: 70**

Instructions:

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

Q.1	**(a)**	With a neat diagram explain the working of a Micro sensor and a Micro actuator.	**07**
	(b)	Describe the various domain applications of MEMS devices.	**07**
Q.2	**(a)**	Evaluate the following: (i) Estimation of induced stresses in thin films after they are produced on the top of base materials is a very easy task. (ii) Creep is a temperature independent phenomenon.	**07**
	(b)	How is the silicon ingot produced? Explain the process with a neat sketch.	**07**
		OR	
	(b)	With a neat sketches explain the two methods of measuring pressure using a MEMS pressure sensor	**07**
Q.3	**(a)**	Explain the difference in Ion Implantation and Diffusion process of micro fabrication.	**07**
	(b)	Growth of Boundary layer affects the deposition in Chemical vapour deposition process. Evaluate.	**07**
		OR	
Q.3	**(a)**	Explain the working and applications of different types of Micro accelerometers. Also discuss the principles of damping used with their applications.	**07**
	(b)	Explain boundary layer and its effect on the deposition during the Chemical Vapour Deposition process.	**07**
Q.4	**(a)**	Discuss the significance of scaling laws in Miniaturization with reference to Geometry and Rigid body dynamics. Why Electromagnetic force is not used for actuation of MEMS devices?	**07**
	(b)	Describe the methods available for making nanostructures. Differentiate between SEM and TEM.	**07**
		OR	
Q.4	**(a)**	Explain the Photolithography process in detail with a suitable example	**07**
	(b)	Explain the CVD process of micro fabrication in detail.	**07**
Q.5	**(a)**	Explain: Molecular Recognition, Electronic Nose.	**07**
	(b)	Discuss various substrate materials and justify the use of silicon as an ideal substrate material.	**07**
		OR	
Q.5	**(a)**	What is a clean room? Differentiate a micro fabrication facility from a traditional machine tool room. Why traditional manufacturing techniques cannot be used at micro level?	**07**
	(b)	Finite Element Analysis plays a very important role in designing nanostructures. Evaluate.	**07**

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