University of Mumbai
Examinations Summer 2022
Program: Electronics Engineering
Curriculum Scheme: Rev 2016
Examination: BE Semester VIII

Course Code: ELX DLO8042 Course Name: MEMS Technology
Time: 2-hour 30 minutes Max. Marks: 80
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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	DMD Stands for ________________________.
Option A:	Discrete Mirror Device
Option B:	Digital Mirror Device
Option C:	Digital Micromirror Device
Option D:	Discrete Micromirror Device
2.	Which of the following is not a piezo electric sensor?
Option A:	PZT
Option B:	Roscelle salt
Option C:	Quartz
Option D:	Microheater
3.	What is Piezo resistivity?
Option A:	Electrical voltage changes in response to mechanical stress
Option B:	Electrical resistance changes in response to mechanical stress
Option C:	Electrical current changes in response to mechanical stress
Option D:	Producing an electric field when subjected to an external force
4.	An Alloy that can be deformed when cold but returns to its pre-deformed shape when heated?
Option A:	Polymers
Option B:	Metal
Option C:	Shape memory alloy
Option D:	Quartz
5.	The ratio of Maximum deflection of cantilever beam to its ----------- is called stiffness of the beam.
Option A:	Load
Option B:	Span
Option C:	Slope
Option D:	reaction at the support.
6.	Lorentz forces are useful for closed-loop feedback in systems employing -------- sensing.
Option A:	Magnetic
Option B:	Electromagnetic
Option C:	Piezoresistive
Option D:	Electrostatic
7.	Product after etching of Si wafer with KoH is-------- shape.
Option A:	Square

Option B:	Circular at the end
Option C:	Trapezoidal
Option D:	Oval
8.	To deposit polymers which deposition method is used?
Option A:	CVD
Option B:	LPCVD
Option C:	HPCVD
Option D:	PECVD
9.	What is Sputtering?
Option A:	Process of Cleaning
Option B:	Process of Deposition
Option C:	Process of Diffusion
Option D:	Process of Oxidation
10.	The principal microfabrication process used in bulk manufacturing is
Option A:	Etching
Option B:	chemical vapour deposition
Option C:	physical vapour deposition
Option D:	Diffusion

Q2 **(20 Marks)**	**Solve any Four out of Six** **5 marks each** (All Questions carry equal marks)
A	Discuss the role of SU8 in MEMS applications.
B	What is MEMS? What is significant difference between Microelectronics and Microsystem?
C	Explain Air-Bag deployment system in brief.
D	Differentiate between bulk and surface micro machining.
E	What are different types of pressure sensors
F	Define the term TCR. Also describe the method of characterization of TCR.

Q3 **(20 Marks)**	**Solve any Two Questions out of Three** **10 marks each** (All Questions carry equal marks)
A	Discuss the process flow of Photolithography. Explain the types of photoresists used.
B	What are micro-actuators pertaining to MEMS Technology? Give two examples.
C	Describe the representative process flow for fabricating the micro-heater. Also explain the operating principle of this MEMS device in detail with its analytical expression.

Q4 **(20 Marks)**	**Solve any Two Questions out of Three** **10 marks each** (All Questions carry equal marks)
A	What is MEMS micromachining? Explain in details fabrication process flow of LIGA. Why electroplating is necessary in LIGA process.
B	What do you mean by wafer bonding? Explain with neat diagram, different wafer bonding techniques.
C	List and explain all the types of failure mechanisms used in MEMS.