Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh semester B.Tech examinations (S), September 2020

Course Code: EC465

Course Name: MEMS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks. Marks

1 a) Explain different types of micro-accelerometers with diagrams. (7)

b) Explain the principle of operation of MEMS based electrostatic sensors and actuators. (8)

2 a) Derive the expression for longitudinal strain under pure bending in flexural beams (8)

b) Explain the general stress -strain relationship with neat sketches (7)

3 a) Explain the working principle of micro-grippers and micro pumps (8)

b) Explain the operating principle of thermal bimorphs with figures.State any two applications of thermal sensors. (7)

PART B

Answer any two full questions, each carries 15 marks.

4 a) With reference to scaling of electrostatic forces, derive the expressions for electrostatic potential energy and force (8)

b) Compare the properties of Silicon, SiO_2 and SiC (7)

5 a) Compare different chemical vapour deposition processes. (8)

b) Explain various scaling laws in miniaturization. (7)

6 a) Derive equations for acceleration a, time t and power density P/V based on the Trimmer Force Scaling Vector. What inference can a MEMS designer draw from the force scaling vector? (8)

b) Explain two processes used for doping silicon substrate and also specify two n and p type dopants. (7)

PART C

Answer any two full questions, each carries 20 marks.

7	a)	Explain with figures the steps in surface micromachining. Discuss the various fabrication challenges associated with surface micromachining.	(10)
	b)	Explain the levels of micro system packaging.	(10)
8	a)	Explain any two bonding techniques for MEMS	(10)
	b)	Explain with diagrams any two applications of RFMEMS.	(10)
9	a)	Describe steps of fabrication of a square tube using LIGA process.	(10)
	b)	Explain two applications which use NEMS technology.	(10)

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