Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

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) State five characteristics of micro sensors and actuators (10)

b) With reference to pure bending of longitudinal beam, derive the expression for the magnitude of applied bending moment. (5)

2 a) State a commercial product which uses MEMS technology. Explain with figures its operating principle of the product. (5)

b) Explain the purpose of micro cantilevers in MEMS systems. What is the relevance of spring constant (k) of the mechanical structure in the micro system? (10)

3 a) Explain with figures the working principle of micro grippers. (5)

b) Explain Lorentz force. Explain the operating principle of magnetic actuators with relevant figures. (10)

PART B

Answer any two full questions, each carries 15 marks.

4 a) State the constraints in pumping fluids in micro channels. What pumping scheme is usually used in micro fluidics, give one example. (10)

b) State three relevant properties of Silicon Carbide and Silicon Nitride for use in Microsystems. (5)

5 a) With relevant figures/ schematics state one application of Silicon Piezo resistors. (5)

b) Explain the steps involved in photolithography. State the chemicals used in each of the stages along with the operating conditions. (10)

6 a) Explain the oxide growth process in Silicon with relevant figures. (5)

b) With reference to scaling of electromagnetic forces, derive the expressions for electromagnetic potential energy and force. (10)

PART C

Answer any two full questions,each carries 20 marks.

7 a) Discuss the criteria for selecting materials for the masks used in etching. (5)

b) Give five relevant points of comparison between bulk and surface micromachining. (5)

c) What is meant by BioMEMS. Discuss the challenges involved in BioMEMS. List three applications of BioMEMS. (10)

8 a) Explain with figure the DRIE and Plasma etching (10)

b) Explain Anodic bonding and Silicon Fusion Bonding. (10)

9 a) Explain the levels of micro system packaging. (10)

b) Explain with figures two application which use NEMS technology (10)

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