

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: AE364
Course Name: MEMS/NEMS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

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|---|----|---|------|
| 1 | a) | Distinguish between microelectronics and microsystems. | (5) |
| | b) | Explain with relevant figure, how photoresist is applied on substrate surface. | (10) |
| 2 | a) | Estimate the associated acceleration 'a', time 't' and power supply to actuate a MEMS component if its weight is reduced by a factor of 10. | (10) |
| | b) | Distinguish between dry etching and wet etching. | (5) |
| 3 | a) | List the application of MEMS in aerospace industry. | (5) |
| | b) | Explain any two mechanical problems associated with surface micromachining. | (10) |

PART B

Answer any two full questions, each carries 15 marks.

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| 4 | a) | Explain the principle of operation of a bimetallic actuator with diagram. | (8) |
| | b) | List various applications of accelerometer sensor in MEMS technology. | (5) |
| | c) | Explain the principle of operation of a piezoelectric actuator. | (2) |
| 5 | a) | Explain the forces involved in electrostatic actuation. | (5) |
| | b) | Explain the working of a capacitive type pressure sensor with suitable diagrams. | (10) |
| 6 | a) | Explain the operation of a reluctance motor with diagrams. | (9) |
| | b) | Explain any three signal processing techniques in MEMS sensor industry. | (6) |

PART C

Answer any two full questions, each carries 20 marks.

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| 7 | a) | Explain the working of nonmechanical type micropumps. | (12) |
| | b) | Enlist any three applications of microfluidics. | (3) |
| | c) | Write down the design equations of micropumps. | (5) |
| 8 | a) | Explain modeling and simulation of micropumps. | (10) |
| | b) | Explain three levels of microsystems packaging. | (10) |
| 9 | a) | Write short on the different types of interfaces in microsystem packaging. | (10) |

- b) Mention the major reliability issues involved in MEMS industry. (5)
- c) Mention the advantages of selecting polymers as substrate material for MEMS. (5)
