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BTECH
(SEM VI) THEORY EXAMINATION 2021-22
INTRODUCTION TO MEMS

Time: 3 Hours**Total Marks: 100****Note :** Attempt all Sections. If require any missing data; then choose suitably**SECTION A****1. Attempt all questions in brief.****2x10 = 20**

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| a. What do mean by fabrication? Explain. | CO1 |
| b. Define air damping. | CO1 |
| c. What is sensor? Explain. | CO2 |
| d. Explain moment of Inertia. | CO2 |
| e. What is Hooke's Law? Explain. | CO3 |
| f. Define viscosity. | CO3 |
| g. How will you define electrostatic force? Explain. | CO4 |
| h. What do you mean by vibration frequency? | CO4 |
| i. Define Thermo-electricity. | CO5 |
| j. What do you mean by step voltage? Explain. | CO5 |

SECTION B**2. Attempt any three of the following:****10x3 = 30**

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| a. What are the processes for Micromachining? Discuss with example. | CO1 |
| b. Discuss the Strain in a bent beam with suitable example using proper diagram. | CO2 |
| c. What is drag force damping? Explain. Also discuss the effect of air damping on micro-dynamics. | CO3 |
| d. Write a note the electrostatic driving of mechanical actuators. | CO4 |
| e. Discuss various MEMS resonator design considerations. | CO5 |

SECTION C**3. Attempt any one of the following:****10x1 = 10**

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| a. Write a note on the various materials and substrates for micro electromechanical system. | CO1 |
| b. Discuss Piezo resistance effect. Also explain the Piezo electricity and Piezo resistive sensors. | CO1 |

4. Attempt any one of the following:**10x1 = 10**

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| a. What do you mean by strain and stress? Discuss these concepts with suitable example about MEMS. | CO2 |
| b. What is a cantilever beam? Describe bending of cantilever beam under a weight. | CO2 |

5. Attempt any one of the following:**10x1 = 10**

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| a. What do you understand by Squeeze-film Air Damping? Explain. Also discuss the Reynolds' Equations for Squeeze-film Air Damping in detail. | CO3 |
| b. Write a note on Stokes-flow Model. | CO3 |

6. Attempt any one of the following:**10x1 = 10**

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| a. Discuss the following with suitable examples: (i) Normal force and Tangential force. (ii) Fringe effect. | CO4 |
| b. Write a note on the negative spring effect and the vibration frequency with proper examples. | CO4 |

7. Attempt any one of the following:**10x1 = 10**

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| a. What do you mean by Temperature coefficient of resistance? Also discuss Thermal and temperature sensors with example. | CO5 |
| b. Write a detailed note on Two-Port Microresonator Modeling. | CO5 |