PAPER ID-420255

Subject Code: KOE063

Roll No: | | | | | | | | | | | | | |

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

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

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

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

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

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

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

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