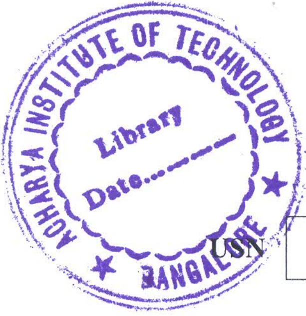
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Sixth Semester B.E. Degree Examination, Jan./Feb. 2021
Micro and Smart Systems Technology

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Explain the need for miniaturization. **(06 Marks)**

b. Explain the multidisciplinary nature of Microsystems. **(08 Marks)**

c. Explain smart material system mention their applications. **(06 Marks)**

2 a. With suitable sketch, explain the construction and working principle of Piezoelectric based Inkjet Printer Head. **(12 Marks)**

b. Enumerate the advantages of following :

i) Silicon Capacitive Accelerometer

ii) Portable Blood Analyser

iii) Piezo – resistive pressure Sensor. **(08 Marks)**

3 a. Write a short note on crystal structure of silicon. **(05 Marks)**

b. Explain sputtering technique for the film deposition. **(05 Marks)**

c. Explain surface micromachining to realize a cantilever structure, with neat Pictorial representation. **(10 Marks)**

4 a. Explain the scaling issues in mechanical domain and thermal domain. **(10 Marks)**

b. Explain the effect of residual stress on a beam supported at different points. **(10 Marks)**

PART – B

5 a. With block diagram, explain the various steps involved in Finite Element Analysis. **(10 Marks)**

b. Compute the squeezed film lumped parameter b_{sqf} (Damping co-efficient) K_{sqf} (fluid spring) for the central mass of accelerometer if it move to substrate. Use of the following numerical data : Viscosity of air $\eta = 2 \times 10^{-5}$ Pas ; Width of the plate $W = 100\mu m$; Length of the plate $\ell = 200\mu m$; Gap beneath the plate $g_o = 1\mu m$; Ambient pressure $P_o = 103$ KPa. **(05 Marks)**

c. List out the advantages FEM simulation and name any four commercial software available for FE simulation. **(05 Marks)**

6 a. Explain operation of an n-channel enhancement MOSFET with neat diagram and characteristics. **(12 Marks)**

b. Explain scottky diode and Tunnel diode with relevant diagrams. **(08 Marks)**

7 a. What are the objectives of packaging explain the challenges and their possible solutions in packaging. **(10 Marks)**

b. Explain wire bonding and flip-chip assembly packaging techniques in detail. **(10 Marks)**

8 a. With block diagram, explain how Smart structure can be used in Vibration control of beam. **(10 Marks)**

b. Explain with suitable sketches, SOI (Silicon – On – Insulator) approach enables, Integration of Electronics with Piezo resistive Pressure Sensor. **(10 Marks)**

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