Assignment 4

The due date for submitting this assignment is 02-26, 23:59 HKT. As per our records, you have not submitted this assignment.

1. Please list the sensor measuring pressure relative to the vacuum.
   - Differential pressure sensor
   - Absolute pressure sensor
   - Gauge pressure sensor
   No, the answer is incorrect. Awarded Answer: [Differential pressure sensor]
   [1 point]

2. I need to calibrate pressure without using any input voltage. Which of the following materials could be used as a sensing element in the pressure sensor?
   - Piezo resistive
   - Piezo electric
   - Capacitive
   - Optical
   None of the above
   No, the answer is incorrect. Awarded Answer: [Piezo resistive]
   [1 point]

3. Which of the following is most preferred as the sensing element in a piezoresistive sensor?
   - Metal foil
   - Thin film silicon
   - Diffused semiconductor
   - Polysilicon alloy
   No, the answer is incorrect. Awarded Answer: [Metal foil]
   [1 point]

4. For a square membrane of side 2a and thickness h, choose the correct relation, where a is the area due to pressure P.
   - \( P_{max} = \frac{P \cdot 2a^2}{h} \)
   - \( P_{max} = \frac{P \cdot 2a}{h} \)
   - \( P_{max} = \frac{P \cdot a}{h} \)
   No, the answer is incorrect. Awarded Answer: \( P_{max} = \frac{P \cdot 2a^2}{h} \)
   [1 point]

5. Mark the correct order in fabricating a piezoresistive pressure sensor:
   1. Machining form for the piezoresistors
   2. Connecting the resistors to form a Wheatstone bridge
   3. Depositing the resistors to form a Wheatstone bridge
   4. Bond bottom wafer to obtain the pressure part
   - 1, 2, 3, 4
   - 2, 1, 3, 4
   - 2, 1, 4, 3
   - 1, 2, 4, 3
   No, the answer is incorrect. Awarded Answer: [1, 2, 3, 4]
   [2 points]

6. Find the applied pressure (in Pa) so that the membrane made of silicon with Young's modulus 170 GPa, side 2a = 500 μm and thickness h = 10 μm made a deflection of 0.1 μm.
   No, the answer is incorrect. Awarded Answer: [Type: Range 500,10]
   [2 points]

7. What will be the burst pressure in Pa for the membrane mentioned in question 6 if maximum strength of silicon is 1 GPa?...
   No, the answer is incorrect. Awarded Answer: [Type: Range 100,1,15]
   [2 points]

8. Polyethylene (a type of polyethylene polyethylene PE, PE, and HDPE, each of them equal to Kr = 1, L = 1, corre) are arranged as shown in figure below so cascade given in a single micro-machined plate connected to a differential pressure transmitter from front and backside - 10 P.S.I. The polyethylene has longitudinal gauge factor (g) and the transverse gauge factor (h) as 2 and 1.0 GPa for polyethylene. In this pressure sensor, what will be the sensitivity (in Pa/N) for an input voltage of 0 V?
   No, the answer is incorrect. Awarded Answer: [Type: Range 100,0,1]
   [4 points]

9. Find the natural frequency (in kHz) of an accelerometer having a pilot mass of 0.2 kg
   Scratch marks are an effective spring constant of 600 from ________ kHz
   No, the answer is incorrect. Awarded Answer: [Type: Range 400,2,1]
   [2 points]

10. The maximum stress (in MPa) pressure sensor can withstand is 7 GPa. Pressure is applied on a square membrane of side 2a = 300 μm and thickness h = 10 μm. What should be the maximum operating range (in psi) of the pressure sensor for a safe application?
   No, the answer is incorrect. Awarded Answer: [Type: Range 20,10]
   [2 points]