

ME 3901 - Midterm Examination

Open Book, Notes, Electronics and Reference-Handout Materials

This exam was performed by:

Name: _____

1.) (40 pts) A 9 volt supply was used as the excitation source for a pressure transducer. The pressure transducer had a linear response. The slope and intercept are 160 psig and -18 psig, respectively based on the relative voltage measurements. What output voltage would a VI read for a 60 psig pressure?

Show all work neatly.

2.) The amount of heat (energy per unit time) entering or leaving a wall into a room can be expressed as

$$Q = A h(T_{\text{wall}} - T_{\text{room}})$$

Where A is the area of the wall +/- 3% uncertainty, h is the heat transfer coefficient +/- 10% uncertainty, T_{wall} is the temperature of the wall +/- 4% uncertainty and T_{room} is the temperature of the room +/- 4% uncertainty. The temperatures are read with the same instrument.

What will the uncertainty be for the Heat (Q)?

Please show all your work neatly.

3.) (45%) A quarter bridge circuit was used to measure strain. This configuration is the same as that used in the soda-can lab with a strain gage of 120 ohms. A micro-Strain of 3200 units was recorded. The Gage Factor was 2.3. Determine the measured voltage change assuming a 5V excitation voltage? Show all your work.