

ME 3901 – Homework

(You can use your notes, textbook, online sources. You cannot discuss this assignment with anyone other than the TA or Instructors.)

Homework is due Wednesday 10/12/2011 by Midnight.

This homework was performed solely by:

Name: _____

1.) (25 pts) A voltage of -3.6×10^{-3} volts was recorded using a potentiometer, which had been zeroed out at 167 °F. Determine the temperature for this voltage in °C assuming a type T thermocouple.

Show all work neatly.

2.) (25 pts) You are stranded on an island (i.e. no mate, refrigerated corona, or even Wilson). You made a make shift raft. You know that you have only one hope for survival. You must set sail towards the coldest water source. However, the temperature difference around the small island's waters is much too difficult for you to determine by simply inserting your finger into the water. You happen to have T/C wire (all that you need and length of wire is not an issue for resistance losses or whatever) and a voltmeter, such as our lab equipment set up. Unfortunately, it doesn't have a built in temperature cold reference junction. Consequently, you build a T/C similar to that in figure 1.

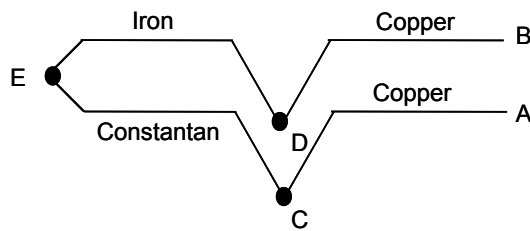


Figure 1: T/C Design

Describe how you will use this T/C to determine the temperature gradients around the island so you can set sail towards the coldest water source. Use the labels (A, B, C, D, and E) of figure 1 for specific connections and/or placements. Show all work for this problem.

3.) (50 pts) The following data are given for a vibrating system with viscous damping:

Weight = 10 lbf (44.48N)

K (spring stiffness) = 30 lbf/in (5253.8 N/m)

B (damping coefficient) = 0.12 lbf/(in/s). [21.0 N/(m/s) or kg/s]

Determine:

The damping ratio,

The logarithmic decrement and

The ratio of any two successive amplitudes.

Please show all work.