QUIZ

(100 pts. - Total)

(25 pts.)   1) Air at 80 F (0.07 lbm/ft^3) flows steadily at 20 ft/s through a smooth pipe (3 in ID and 20 ft long). Determine the pressure drop [psi] through the pipe assuming the flow is fully developed. (g_c = 32.2 lbm-ft/lbf-s^2)

(25 pts.)   2) Air is heated as it flows through a heat exchanger. The heat exchanger is instrumented to ultimately determine the heat transfer to the air. The diameter of the flow passage (tube) is 3.063 in. The air density and specific heat are 0.07489 lbm/ft^3 and 0.2404 Btu/lbm-F, respectively. The air velocity is measured at 20.0 ft/s with an accuracy of 1.5 ft/s. The outlet air temperature is measured at 110.8 F with an accuracy of ±0.2 F. The inlet air temperature is measured at 80.2 F with an accuracy of ±0.2 F. Determine the heat transfer rate [Btu/s] and its uncertainty. Remember to consider significant digits.

(5 pts.)   3)   Drag around a cylinder is the sum of shear and pressure forces acting on the cylinder's surface. True or False.

(5 pts.)   4)   In words describe how you would determine if the flow can be assumed as fully developed in an internal flow.

(5 pts.)   5)   In the 'compression of a gas' experiment, list the assumption(s) that were made in using the polytropic relation for the gas process.

(5 pts.)   6)   Name 3 sensor types used to measure temperature which the engineer is likely to come in contact with.

(5 pts.)   7)   Describe the fundamental principle (or relationship) which the RTD is based upon for its operation.