QUIZ #1 - Solution

MECH 430 Instrumentation & Measurement

Question 1

A rotary variable differential transformer has a specification which includes the following information:

Ranges: $\pm 30^o$, linearity error $\pm 0.5\%$ full range
              $\pm 60^o$, linearity error $\pm 2.0\%$ full range
Sensitivity: 1.1 (mV/V input)/degree
Impedance: Primary 750 Ω, Secondary 2000 Ω
What will be

   (a) The error in a reading of 40° due to nonlinearity when the RVDT is used on the $\pm 60^o$ range?

The error in Reading is: (2.0/100)*120=2.4^o

   (b) The output voltage change that occurs per degree if there is an input voltage of 3V?

1.1 (mV/V input) * 3 (V input) = 3.3 V/degree

   (c) The resolution of the RVDT if the input voltage is 5V if the reading instrument has a resolution of 0.1 mV?

Based on the 5V input, the sensitivity is 5.5 V/degree, for every 0.1 mV, the resolution is: 0.018182^o.

Question 2

What are the desirable sensor characteristics for:

   - Sensitivity: **Large AND Constant**

   - Nonlinearity: **Zero (nonexistent)**

   - Full Scale**: Large or Infinite**

   - Zero Drift: **Zero (nonexistent)**

   - Bandwidth: **Large or Infinite**