Q 3.:– Raw:– Input span is +10/–10v=20v. Output span is 255 counts.
Therefore $\frac{255}{20}$ =12.25counts/v. Always round down in integer arirhmetic.
Since 12 is equidistant from 2^3 and 2^4, either would be acceptable.
With amplifier:– Input span is 200v. Output span is still 255 counts.
Therefore $\frac{255}{200}$ =1.225counts/v. Again, round down.
Since $1=2^0$, this too is acceptable. The –30v to +50v doesn't change anything.

$\frac{(80/200)255=1.225}{80}$

2. An 8–bit differential ADC with an input voltage range of ±10v should be augmented with a differential input instrumentation amplifier of gain $\times10^{-2}$ $\times10^{-1}$ $\times10^{0}$ $\times10^{1}$ $\times10^{2}$
(They are only ☐ ■ ☐ ☐ ☐
available with
settings of $\times10^{\pm n}$) in order to achieve maximum resolution
when measuring a signal expected to vary between –30 and +50v?

3. What is the precision in counts/volt achieved in 2., above?

2^0 2^1 2^2 2^3 2^4 2^5 2^6
■ ☐ ☐ ■ ■ ☐ ☐

(28)MLS42k3

Midterm Test 04–02–19, 80min. 261, 120min. 262
Name:– key
Student Number:– _____
(circle one) MECH 261 262