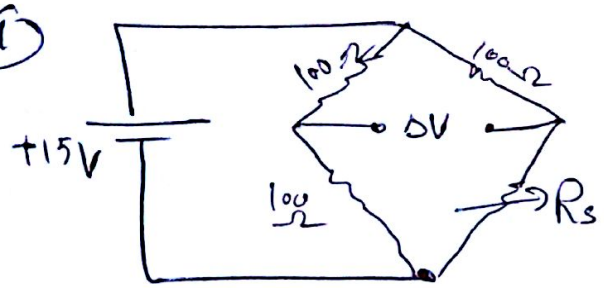
A wheatstone Bridge with R1 = R2 = R3 = 100 Ω. The sensor (R4 ≡ Rs) has a nominal resistance of 100 Ω. Vs = 15 V.

1 6) Draw a schematic figure of the above measurement system.
2 7) If Rs = 105 Ω, what is voltage offset (ΔV)?
3 8) If ΔV = 0.05 V, what is the value of R4?
4 9) If ΔV = 0.06 V, what is the value of R4?
5 10) What is the resolution of the bridge if ΔV jumps from 0.05 V to 0.06V? (i.e., the detector resolution is 0.01 V and use the above two points)?

(1)



(2) $\Delta V = 15\left[\frac{100}{100+100} - \frac{105}{105+100}\right] = -0.183\ V$

(3) $0.05 = 15\left[\frac{100}{100+100} - \frac{R_{s,1}}{R_{s,1}+100}\right] \Rightarrow R_{s,1} = 98.675\ \Omega$

(4) $0.06 = 15\left[\frac{100}{100+100} - \frac{R_{s,2}}{R_{s,2}+100}\right] \Rightarrow R_{s,2} = 98.413\ \Omega$

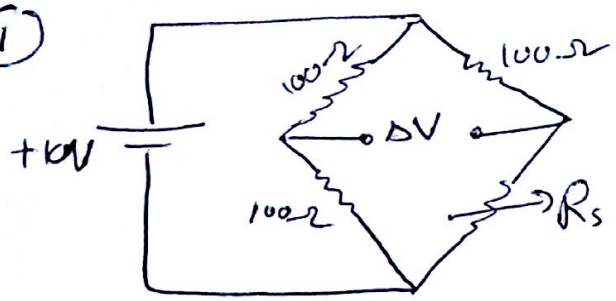
(5) $Resolution = |\Delta R_s| = |98.675 - 98.413|$

$= 0.262\ \Omega$

A wheatstone Bridge with R1 = R2 = R3 = 100 Ω. The sensor (R4 ≡ Rs) has a nominal resistance of 100 Ω. Vs = 10 V.

1) Draw a schematic figure of the above measurement system.
2) If Rs = 105 Ω, what is voltage offset (ΔV)?
3) If ΔV = 0.05 V, what is the value of R4?
4) If ΔV = 0.06 V, what is the value of R4?
5) What is the resolution of the bridge if ΔV jumps from 0.05 V to 0.06V? (i.e., the detector resolution is 0.01 V and use the above two points)?

(1)



(2) $\Delta V = 10\left[\frac{100}{100+100} - \frac{105}{105+100}\right] = -0.122$ V

(3) $0.05 = 10\left[\frac{100}{100+100} - \frac{R_{s,1}}{R_{s,1}+100}\right] \Longrightarrow R_{s,1} = 98.020\ \Omega$

$0.06 = 10\left[\frac{100}{100+100} - \frac{R_{s,2}}{R_{s,2}+100}\right] \Longrightarrow R_{s,2} = 97.628\ \Omega$

$\text{Resolution} = |\Delta R_s| = |98.020 - 97.628|$

$= 0.392\ \Omega$