PART 4 (FIG 13)

$CMRR = 20\log\left(\frac{A_d}{A_{cm}}\right)$

$A_d = 4.343\,V/V$

$A_{cm} = 0.016\,V/V$

$\boxed{CMRR = 48.67\,dB}$

PART 5

FROM PART 1

$I_{TAIL} = 348\,\mu A$

$V_{DS4} = V_{GS4} = 700mV$

$V_{DS3} = V_{GS3} = 700mV$

$V_{G3} = 1.4V$

$V_{DS5} = 700mV$

$V_{DS0} = 200mV$

$\Big\} V_{O_0} = 900mV$

$R_L = \frac{550mV}{(I_{TAIL}/2)}$

$R_L = 3.16\,k\Omega$

$I_{REF} = \frac{\beta}{2}\left(\frac{W}{L}\right)_3 V_{OV}^2\left(1 + \frac{V_{DS3}}{V_A}\right)$

$\left(\frac{W}{L}\right)_3 = 42.48$

$\boxed{W_3 = 10.62\,\mu m,\ L_3 = 0.25\,\mu m}$

$I_{REF} = \frac{\beta}{2}\left(\frac{W}{L}\right)_4 V_{OV}^2\left(1 + \frac{V_{DS4}}{V_A}\right)$

$\left(\frac{W}{L}\right)_4 = 42.48$

$\boxed{W_4 = 10.62\,\mu m,\ L_4 = 0.25\,\mu m}$

$I_{REF} = \frac{\beta}{2}\left(\frac{W}{L}\right)_5 V_{OV}^2\left(1 + \frac{V_{DS5}}{V_A}\right)$

$\left(\frac{W}{L}\right)_5 = 42.48$

$\boxed{W_5 = 10.62\,\mu m,\ L_5 = 0.25\,\mu m}$

$I_{REF} = \frac{\beta}{2}\left(\frac{W}{L}\right)_0 V_{OV}^2\left(1 + \frac{V_{DS0}}{V_A}\right)$

$\left(\frac{W}{L}\right)_0 = 50.35$

$\boxed{W_0 = 12.59\,\mu m,\ L_0 = 0.25\,\mu m}$

FROM SIMULATION:

$A_{cc} = 0.363\,mV/V$

$CMRR = 20\log\left(\frac{A_d}{A_{cm}}\right)$

$\boxed{CMRR = 81.56\,dB}$