SELECTIVE FORMULAE IN ANALOGUE ELECTRONICS

Operational Amplifier:

$$A_{DM} = \frac{R_2}{R_1}\left[1 - \frac{\in (R_1+2R_2)}{2(R_1+R_2)}\right] \qquad \text{and} \qquad A_{CM} = \frac{R_2 \in}{(R_1 + R_2)}$$

$$CMRR = 20\log\left|\frac{A_{DM}}{A_{CM}}\right|$$

Inverting Amplifier:

$$V_{out} = -\left(\frac{R_2}{R_1}\right)V_{in}$$

Non-Inverting Amplifier:

$$V_{out} = \left(1 + \frac{R_2}{R_1}\right)V_{in}$$

Summing Amplifier:

$$V_{out} = \left(\frac{R_f}{R_1}V_1 + \frac{R_f}{R_2}V_2 + \frac{R_f}{R_3}V_3 + \cdots\right)$$

Differential Amplifier:

$$v_{out} = \frac{R_2}{R_1}\left[\left(\frac{1 + \frac{R_1}{R_2}}{1 + \frac{R_3}{R_4}}\right)v_2 - v_1\right]$$

Instrumentation Amplifier:

$$v_{out} = \left(\frac{R_2}{R_1}\right)\left(1 + \frac{2R_3}{R_G}\right)(v_1 - v_2)$$

Comparator:

$$\Delta V_t = V_{TH} - V_{TL}$$

$$\Delta V_T = \left(\frac{R_1}{R_1 + R_2}\right) \times (V_{OH} - V_{OL})$$

Oscillator (Wien-Bridge):

$$\frac{V_o}{V_i} = \frac{j\omega C_1 R_2}{1 + j\omega(C_1R_2 + C_2R_2 + C_1R_1) - \omega^2(C_1C_2R_1R_2)}$$

$$\omega^2 = \frac{1}{C_1C_2R_1R_2}$$