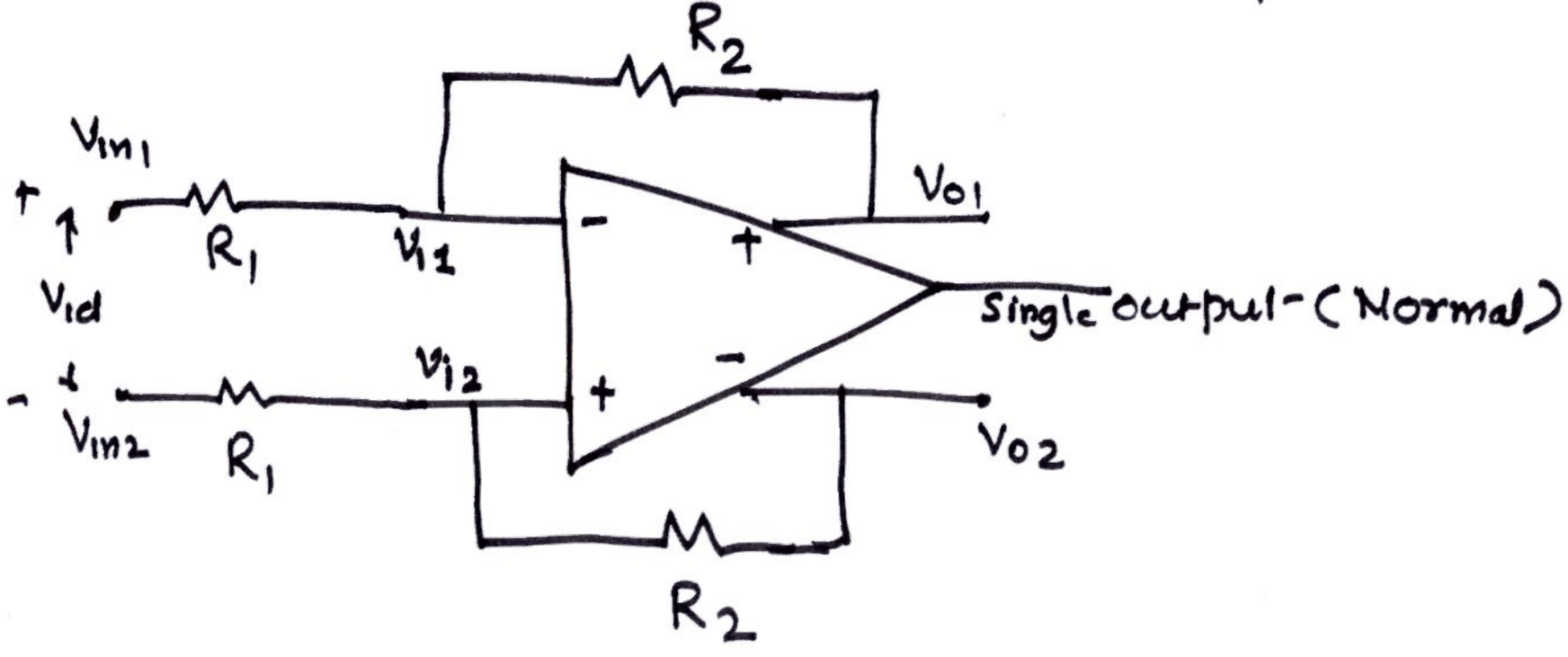
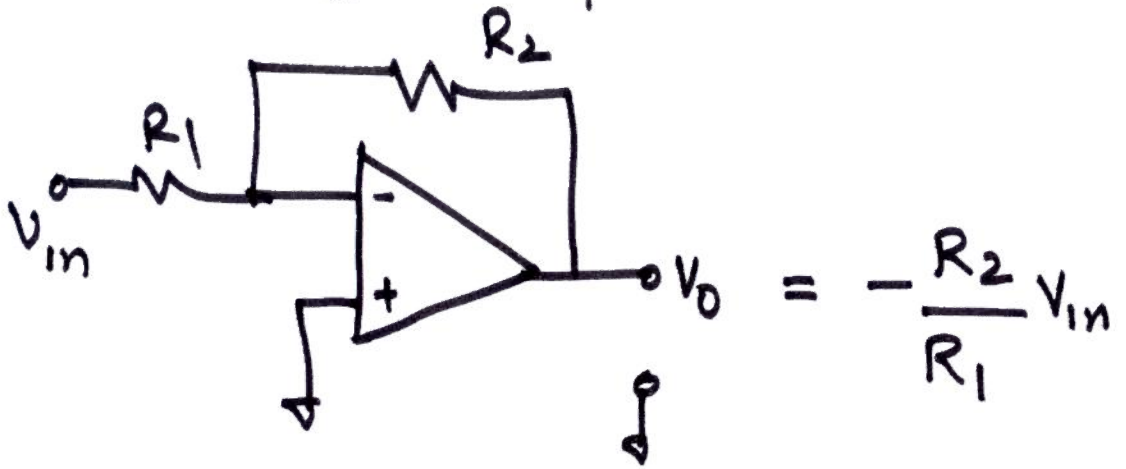
Fully Differential OPAMP

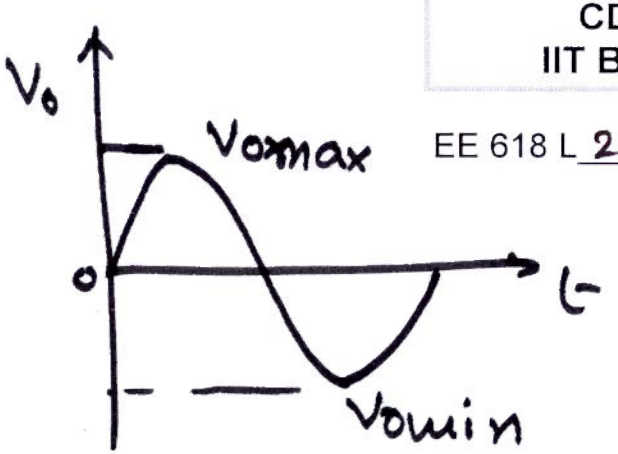
It's generally operated with Balance Input and produces Balance Output



For Single output OPAMP an Amplifier is



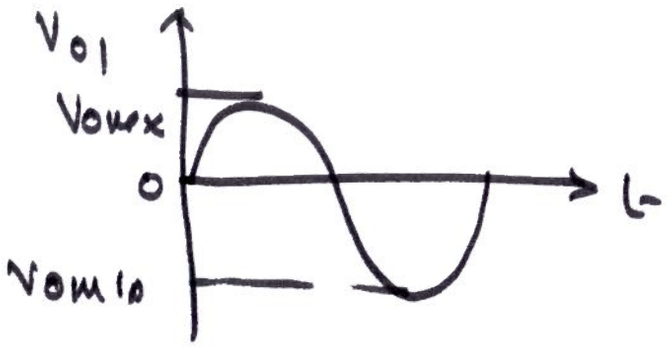
$$V_o = -\frac{R_2}{R_1} V_{in}$$

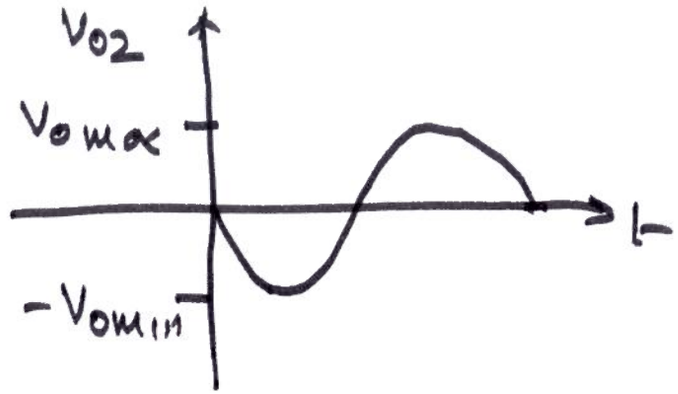


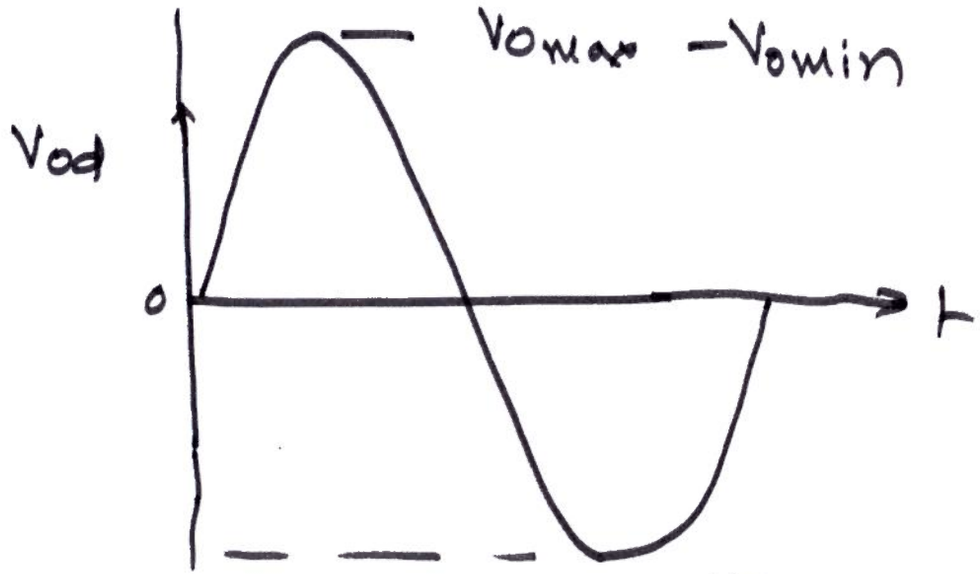
$$V_{ocommon} = \frac{V_{omax} + V_{omin}}{2}$$

i.e. $V_{OCM} = 0$ If $V_{omax} = -V_{omin}$

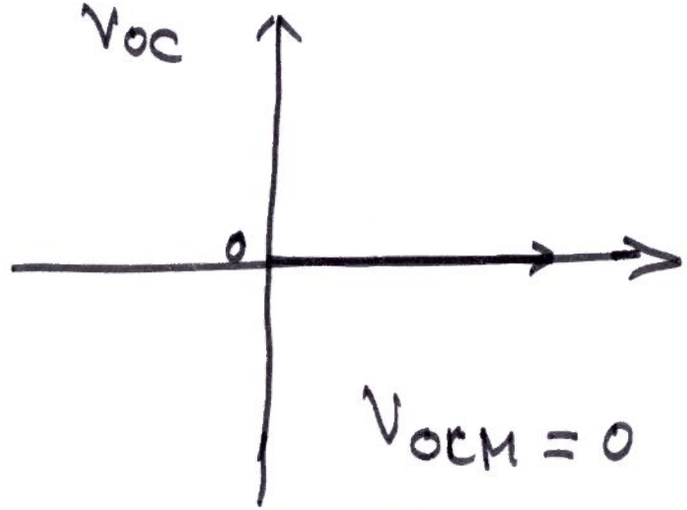
In case of Balanced (Symmetric) Fully Differential System, V_{o1} & V_{o2} look like :







Difference Mode Output



$V_{ocM} = 0$

If $V_{omax} = -V_{omin}$

Common Mode Output

We may need Amplifier with

(1) Higher Gain

(2) Higher SNR (Signal to Noise Ratio)

where $SNR = \dfrac{\text{Max. Signal Output Power } (V_{sig_m}^2/2)}{\text{Output Noise Power } (\bar{V}_{ON}^2)}$

where $\bar{V}_{ON}^2$ (Single ended) $= (1+\frac{R_2}{R_1})^2 4kTR_1 f_N$

$\bar{V}_{on}^2$ (Fully Differential) $= 2(1+\frac{R_2}{R_1})^2 4kTR_1 f_N$

$V_{signal\,(peak)}$ for Single ended $= V_{omax} - V_{mean}$

$\therefore$ $\therefore$ F. Differential $= 2(V_{oxm} - V_{omin})$