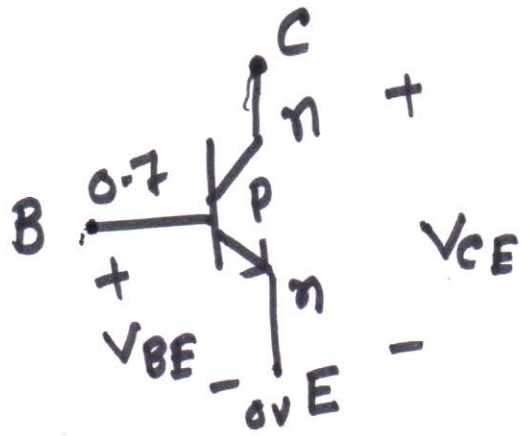
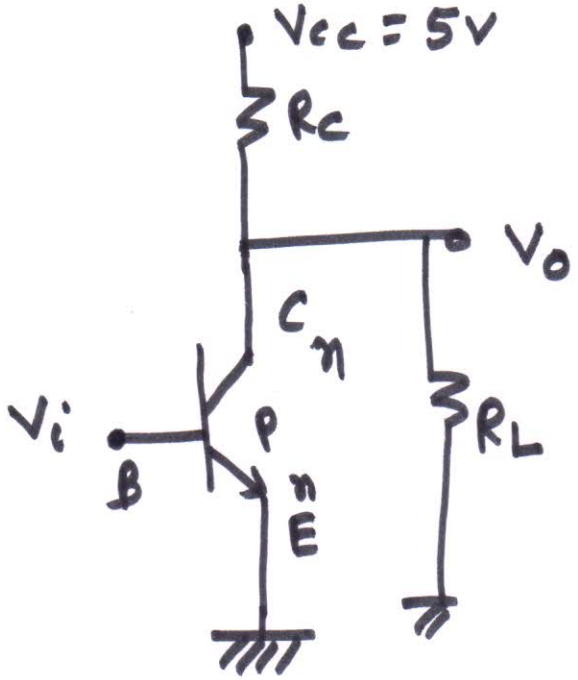


Applications

Amplification	Switching
• Active BE Jun. → F.B BC Jun. → R.B $I_C = \beta I_B$ $V_{BE} = 0.7\,V$ $V_{CE} > 0.2\,V$	• Cut off BE Jun. → R.B Bc Jun. → R.B $I_B = I_C = I_E = 0$ (open ckt) 'OFF' • Saturation BE Jun. → F.B Bc Jun. → F.B $V_{CE_{sat}} = 0.2\,V \approx 0\,V$ (Short ckt) 'ON' $I_C < \beta I_B$

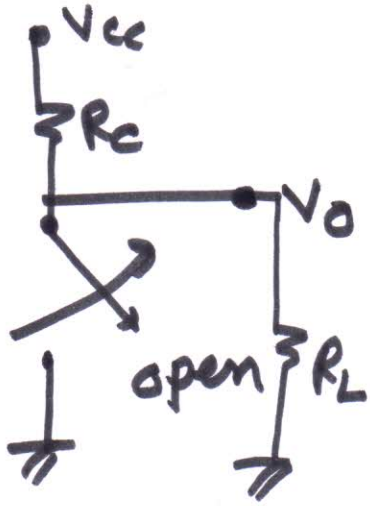
NOT



Case 1:

$V_i = 0V$

Transistor → 'cut off'



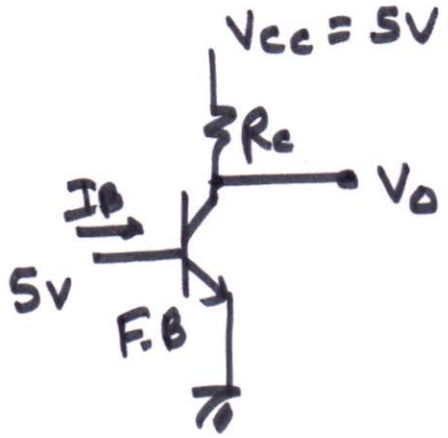
$$V_o = \frac{R_L}{R_c + R_L} \times V_{cc}$$

$V_o \rightarrow$ 'high'

$\Rightarrow \quad V_i \rightarrow$ '0' $\quad \Rightarrow \quad V_o \rightarrow$ '1'

Case 2 :

$V_i = 5V$

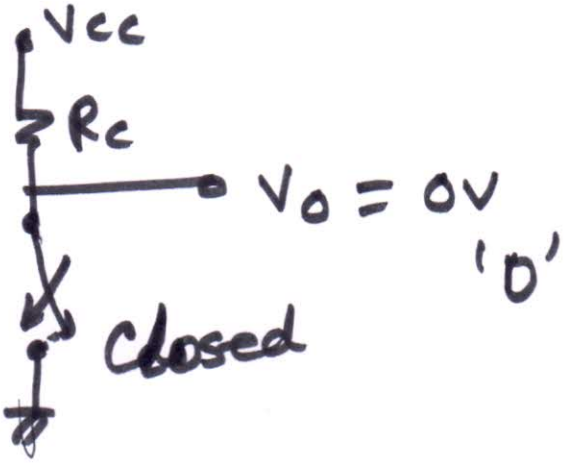


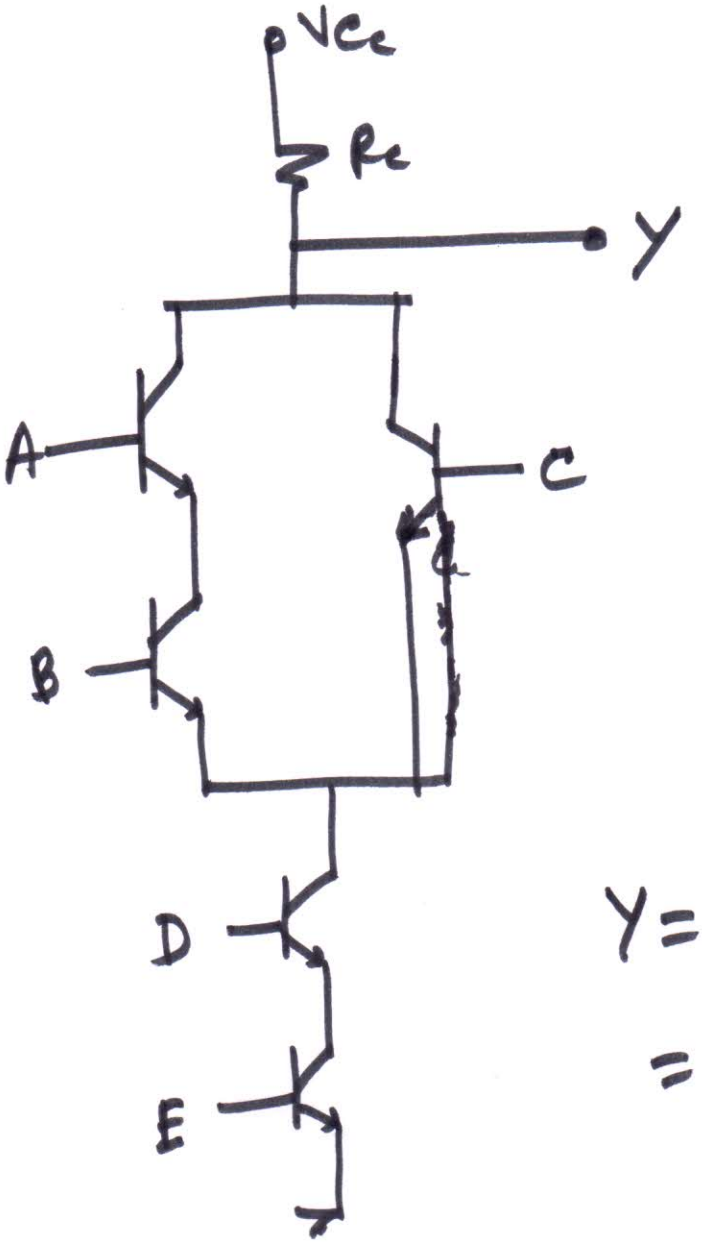
Saturation Region

$V_{CE} = 0.2V$

$\approx 0V$

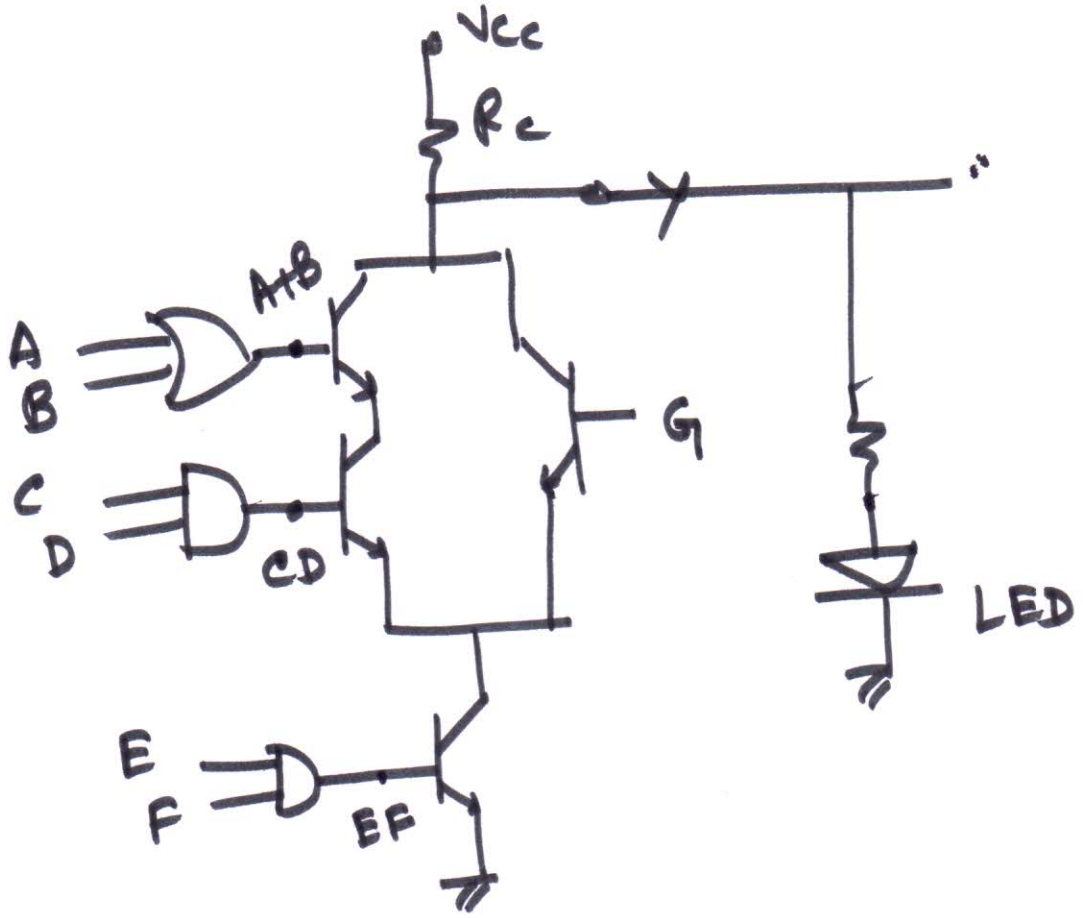
(Short ckt)





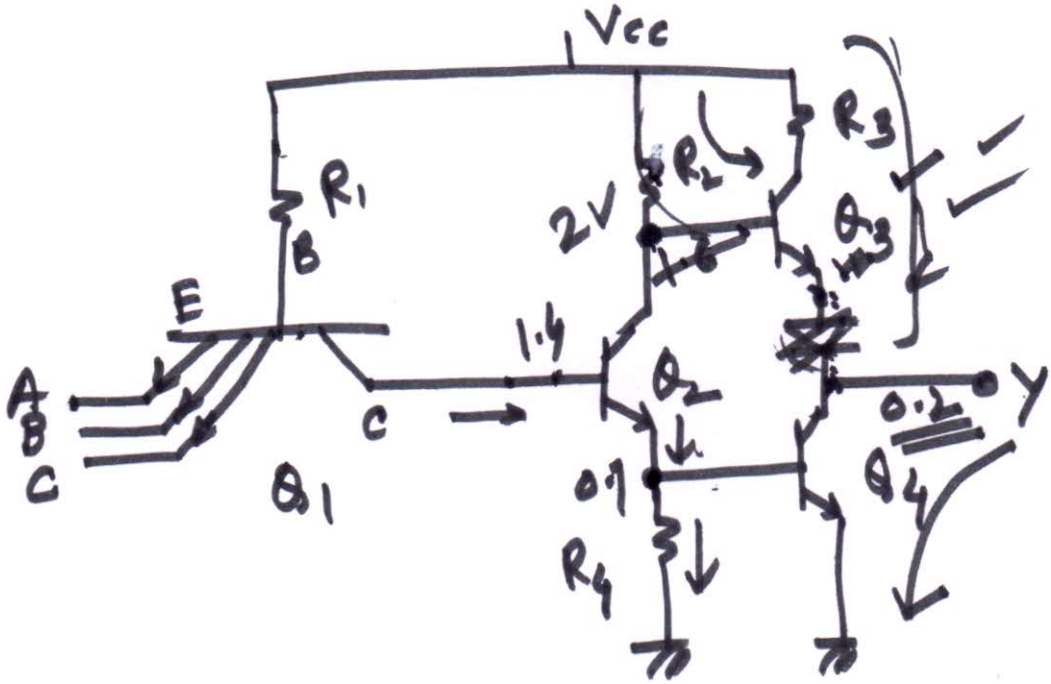
$$Y = \overline{ABDE + CDE}$$

$$= \overline{(AB+C)DE}$$



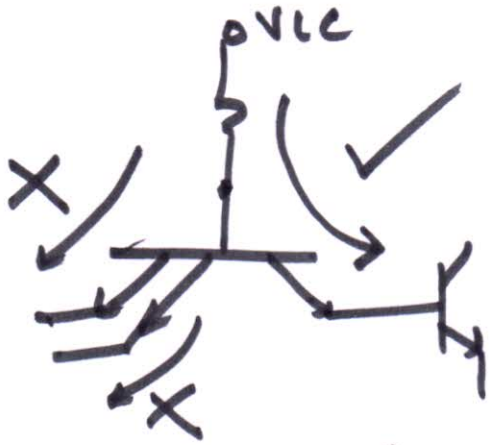
$$Y = \overline{\left[(A+B)CD + G\right]EF}$$

TTL NAND



Case 1:

When all the I/Ps are high ('1').



BE Junction → R.B

Bc Jun. → F.B

Q_1 → Inverse Active

Q_2 → 'ON' (saturation)

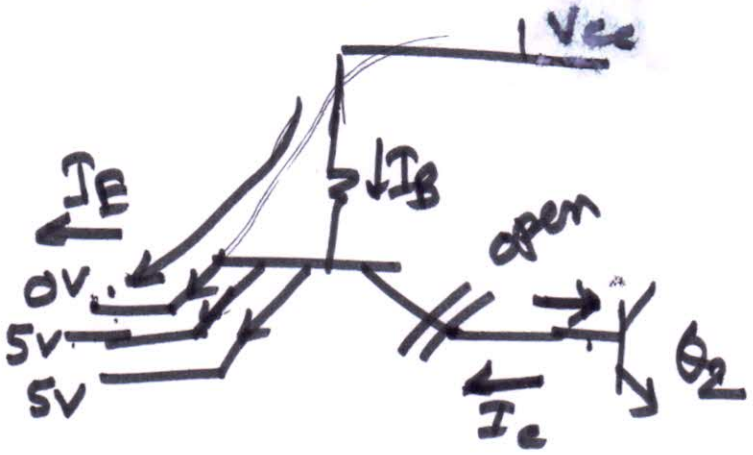
Q_4 → 'Sat'

$Y = '0'$

Q_3 → 'ON'/'OFF' → preferable (if diode is used & Q_2 is in saturation)

Case 2:

If any one i/p is low



$Q_2 \rightarrow$ 'OFF'

$Q_1 \rightarrow$ 'OFF'

$Y = '1'$