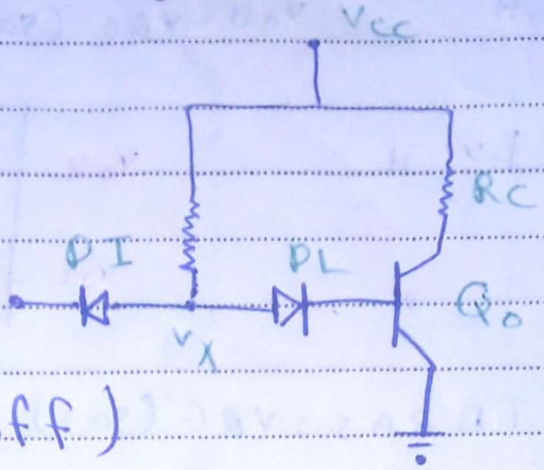
Subject: الأسبوع الرابع / /

DTL

Diode – Transistor logic

* Inverter

الأنيا أما DI شغال وبالتالي
DL طافي والعكس صحيح



$DI(on) \Rightarrow DL, Q_o(off)$

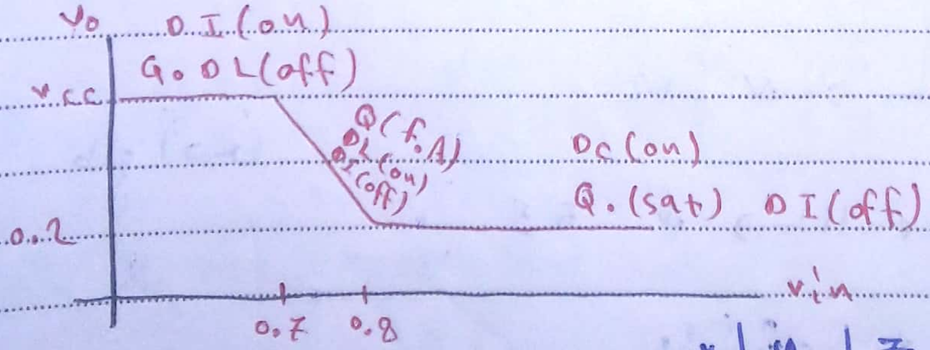
$DI(off) \Rightarrow DI(on), Q_o(sat)$

نجد قيمة v_x

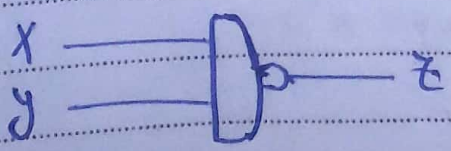
$v_x = v_{in} + V_{DI}(on) = V_{D}((on) + V_{BE}(f.A)$ لها طريقتان

$v_{in} = V_{BE}(fA)$

$DI(on) \Rightarrow v_{inL} \leq 0.7 \; (V_{BE}(f.A))$



Nand gate



X	y	Z
L	L	H
L	H	H
H	L	H
H	H	L

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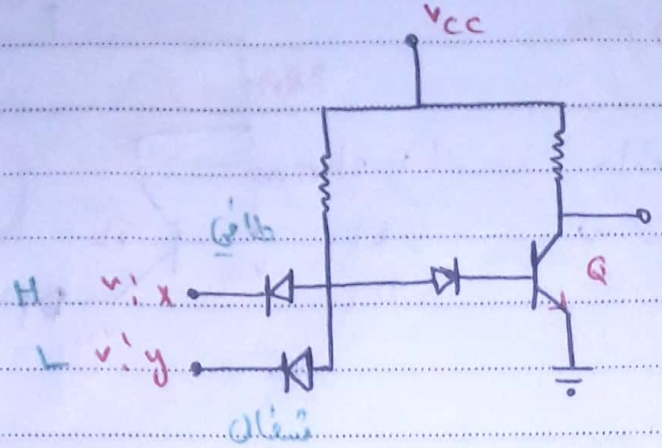


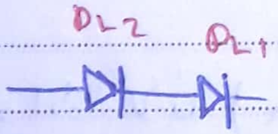
يعني اذا طافي وطافي بيعطي Vcc = Vo

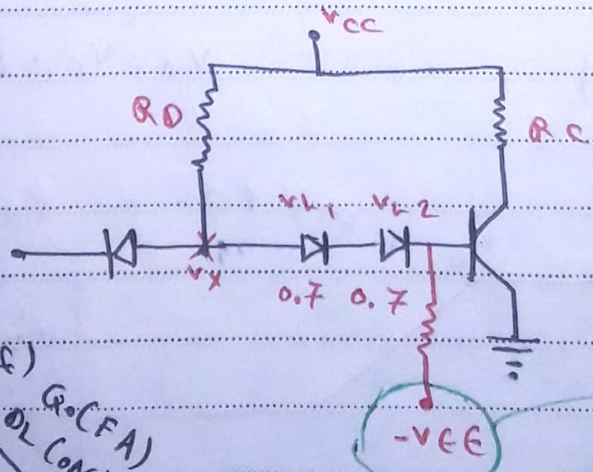
* للحصول على دارة ال ANd نضيف Inverter على Vo

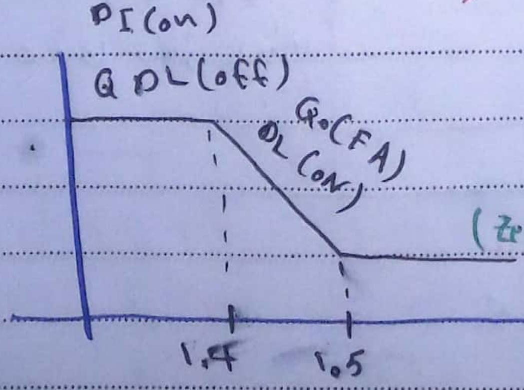
* للحصول على شغل في Vin نقوم بإضافة ديود / للتقليل من النويز

{ 1.4 , 1.5 } بدل من 0.7 ، 0.8
(vil , viH)

وذلك من خلال إضافة ديود بجانب







نقوم بإضافته لتفريغ الشحنة عليه بدلاً من استخدام (zero) ولكن عند وجود مصدر جهد يكون التفريغ أسرع.

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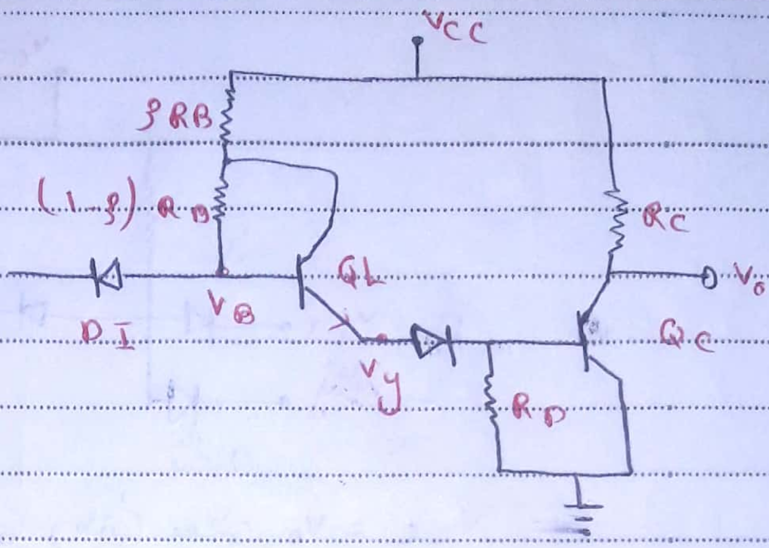
mod fied DTL



$V_x > V_B$ دائماً "

تسمى

super load

$V_y = V_x$

وضعنا BjT وذلك لرفع قيمة التيار وبالتالي رفع الفان أوت

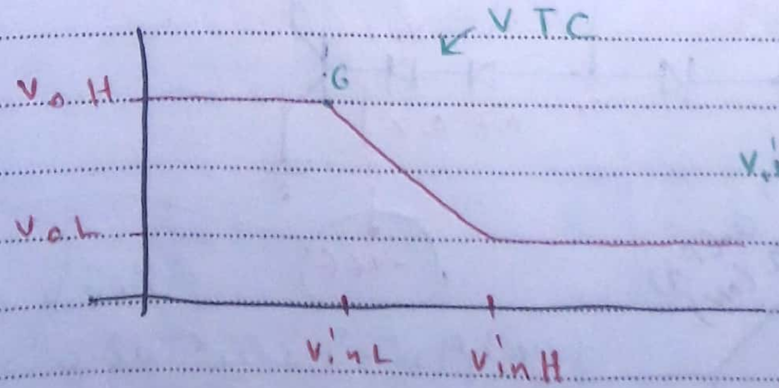
① D_{I_1} (ON)
QL (off)
DL (off)
Qc (off)

عندما تكون
$V_{in} = L$

$V_o = V_{oH} = V_{CC}$

② D_{I_1} (off)
QL (F.A) ⟶ ($V_B < V_x$) لأن " دائماً F.A يبقى
DL (ON)
Qo (sat)

$V_o = V_{CE(sat)} = V_{oL} = 0.2$



الحالة الأولى تكون
شغال عندما تكون V_{inL}

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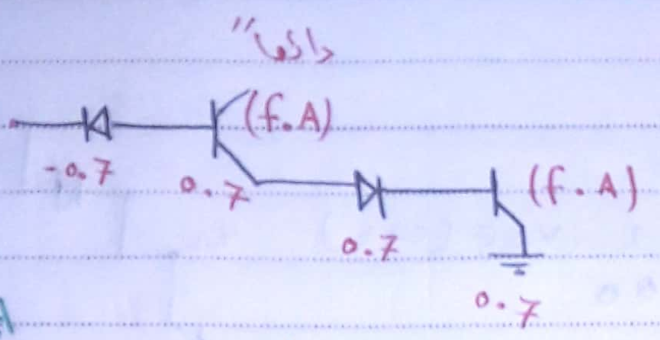
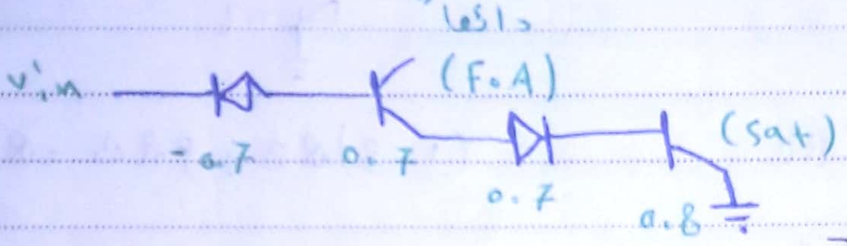


ولة
min

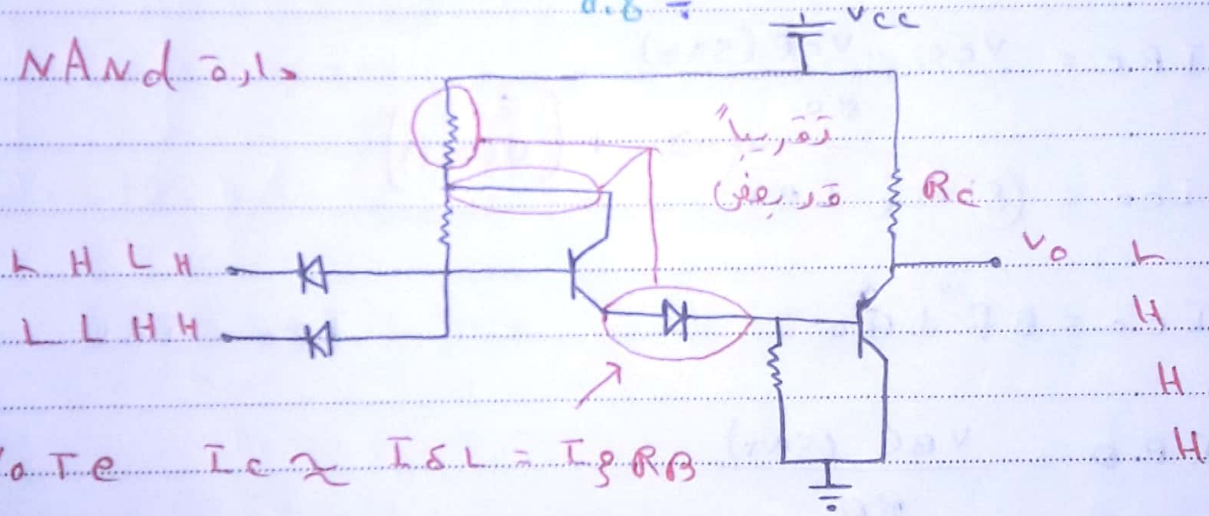
= 1.4

V_{in} H



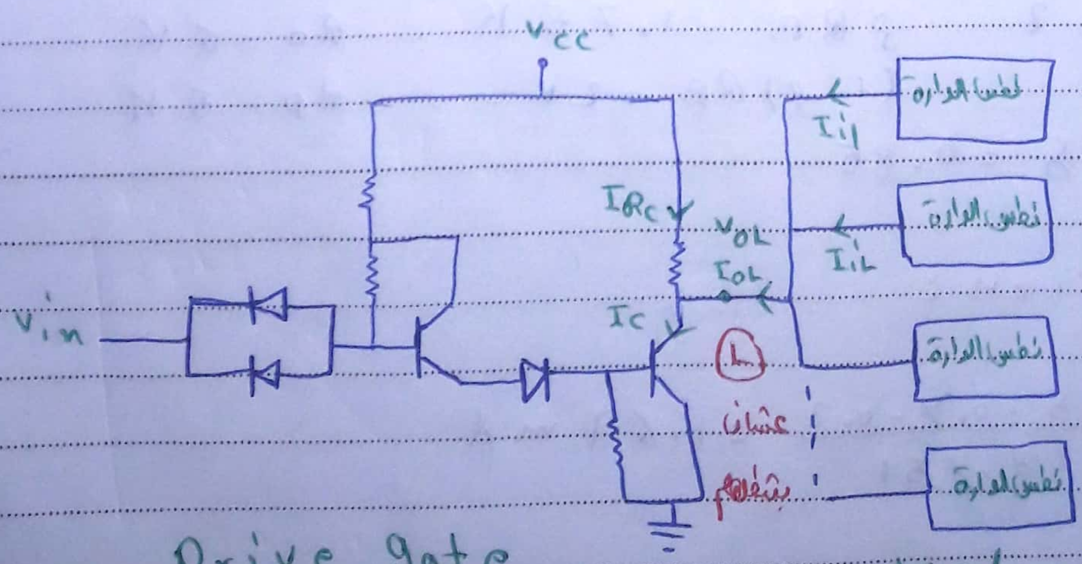
= 1.5 V

NAnd دارة



Note $I_c \approx I_{BL} = I_B R_B$

Inverter ⟶ NAND
non inverter ⟶ AND



Drive gate

load

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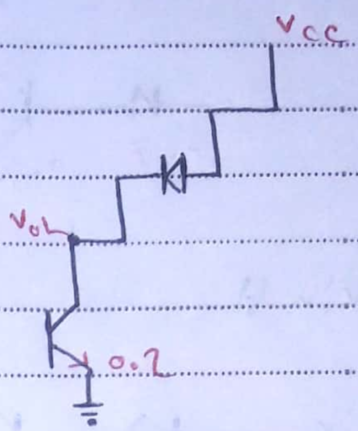

$N = \frac{I_{oL}}{I_{iL}}$

$I_{iL} = \frac{V_{CC} - V_{OI} - V_{CE(sat)}}{R_B}$

ⓐ KCl

$I_{oi} = I_{co} - I_{RC}$ $(1-\rho)R_B + \rho R_B = R_B$

$I_{RC} = \frac{V_{CC} - V_{CE(sat)}}{R_C}$

$I_{co} = \delta \beta_f I_{Bo}$ → $= 1 \begin{pmatrix} \text{Eos} \\ \text{B(sat)} \end{pmatrix}$

$I_{co} = \beta_f I_{Bo}$ $I_{Bo} = I_{EL} - I_{RD}$

$I_{RD} = \frac{V_{BE(sat)}}{R_D}$

$I_{EL} = I_{CL} = I_{\rho R_B} = \frac{V_{CC} - V_{BEL(f.A)} - V_{oL(ON)} - V_{BEo(Sat)}}{\rho R_B}$

ex 6.2 $\rho R_B = 1.75\ K$ $R_C = 6\ K$
$(1-\rho) R_B = 2\ K$ $R_D = 5\ K$

ⓐ $\delta = 0.85$

Solution:

$I_{iL} = \frac{5 - 0.7 - 0.2}{3.751} = 1.69\ mA$

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$$I_{RC} = \frac{5 - 0.2}{6K} = 800 \mu A$$

$$I_{RD} = \frac{0.8}{5K} = 160 \mu A$$

$$I_{EL} = \frac{5 - 0.7 - 0.7 - 0.8}{1.75K} = 1.6 \, mA$$

$$I_{BO} = 1.6m - 16 \mu A = 1.44 mA$$

$$I_{CO} = 0.85 \times 49 \times 1.44 m = 60 mA$$

$$I_{OL} = 60 mA - 800 \mu \quad 54.2 mA$$

$$N = \frac{59.2 \, m}{1.09 \, m} = 54.3 \approx 54$$

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