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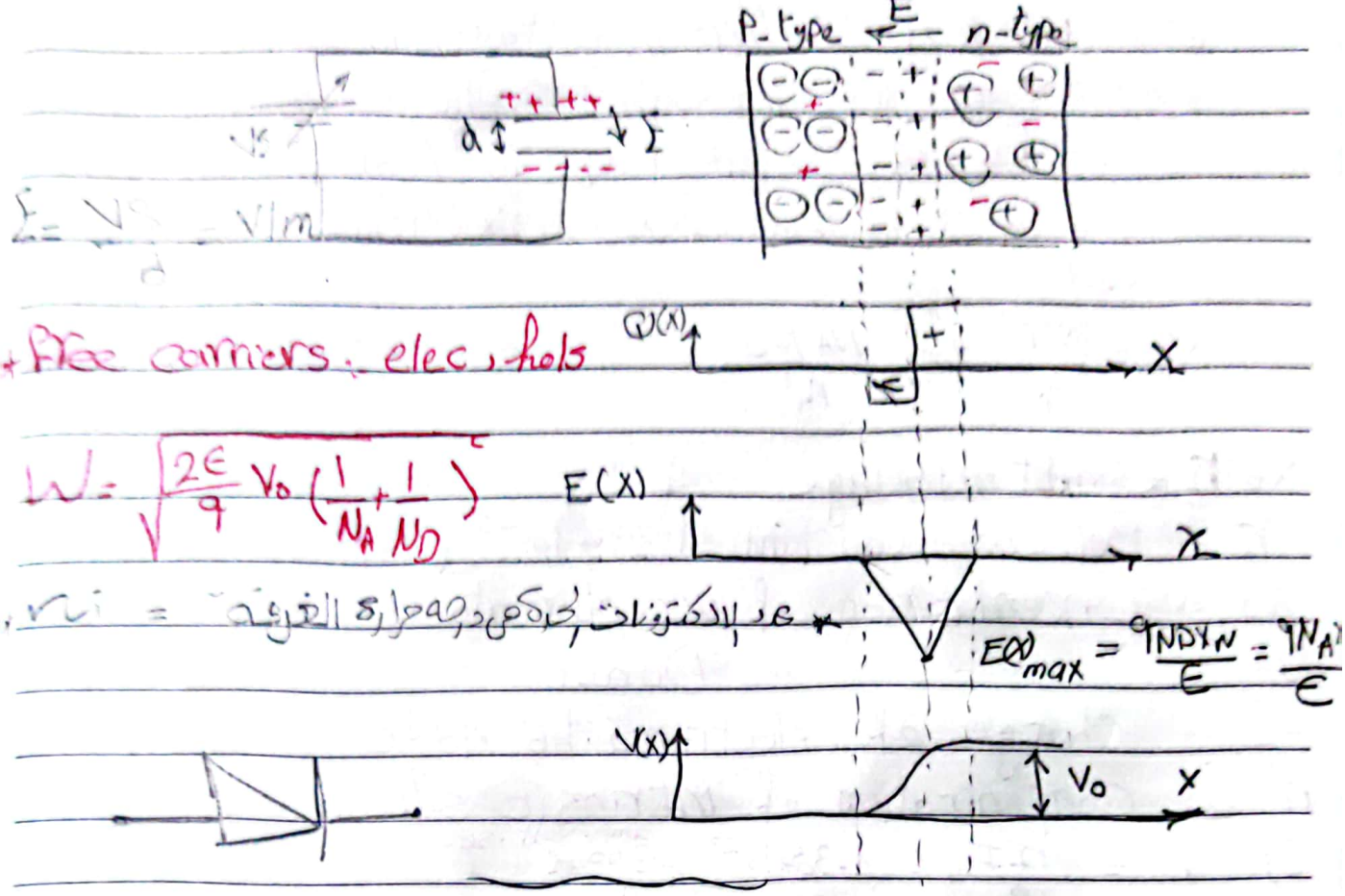
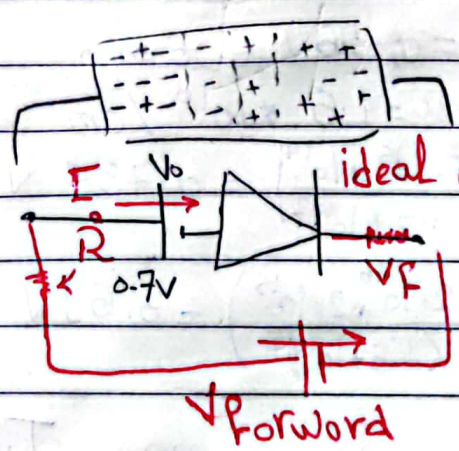


+ free carriers : elec , hols

$$W = \sqrt{\frac{2\epsilon}{q} V_o \left(\frac{1}{N_A} + \frac{1}{N_D}\right)}$$

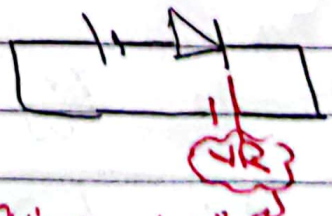
$$E(x)_{max} = \frac{qN_D x_n}{\epsilon} = \frac{qN_A x_p}{\epsilon}$$



$$I = \frac{V_f - 0.7}{V_f + R}$$

+ لو Revers مش هيتحرك هيشتغل Varactor
(Variable Capacitor)

$$C = \epsilon_s \frac{A}{w(v)}$$



مكثف متغير السعه

Depletion region تزداد

P-n Junction under Equilibrium

$$J_n = q_n N_n E + q D_n \frac{dn}{dx}$$

$$J_p = q_p N_p E - q D_p \frac{dp}{dx}$$

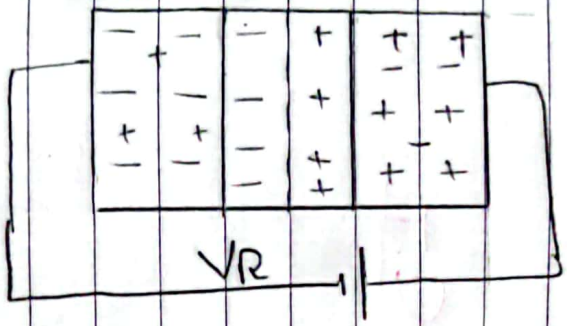
$$V_o = \frac{KT}{q} \ln \frac{N_A N_D}{N_i^2}$$

$$V_o = V_T \ln \left(\frac{N_A N_D}{N_i^2} \right)$$

↳ Barrier voltage

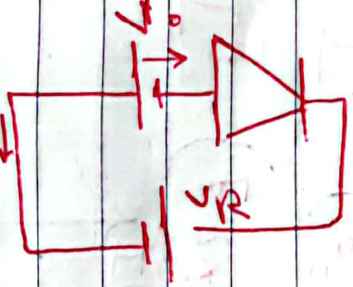
$$W = \sqrt{\frac{2\epsilon}{q} V_o \left(\frac{1}{N_A} + \frac{1}{N_D} \right)}$$

P-n Junction under revers



$I = 0$

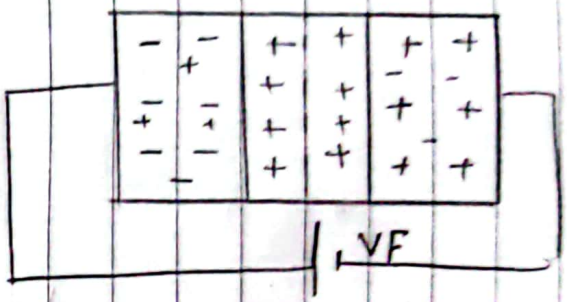
$I_D = I_S$



$$W = \sqrt{\frac{2\epsilon}{q} V_o \left(\frac{1}{N_a} - \frac{1}{N_D} \right)}$$

$$C_J = \epsilon_s \frac{A_s}{W}$$

P-n Junction Forward Bias



$$W = \sqrt{\frac{2\epsilon}{q} V_o \left(\frac{1}{N_A} - \frac{1}{N_D} \right)}$$

$$I_D = I_S e^{\frac{q V_o}{\eta V_T}}$$

$$= I_S \left(e^{\eta o V_D} - 1 \right)$$

$$\simeq I_S e^{\eta o V_D}$$

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Schottky Equation $I_D = I_S \left(e^{\frac{V_o}{\eta V_T}} - 1 \right)$ ✗ $V_T = \frac{KT}{q}$

η .. ideal Factor

$T = 300K$ $V_T = 25.8$

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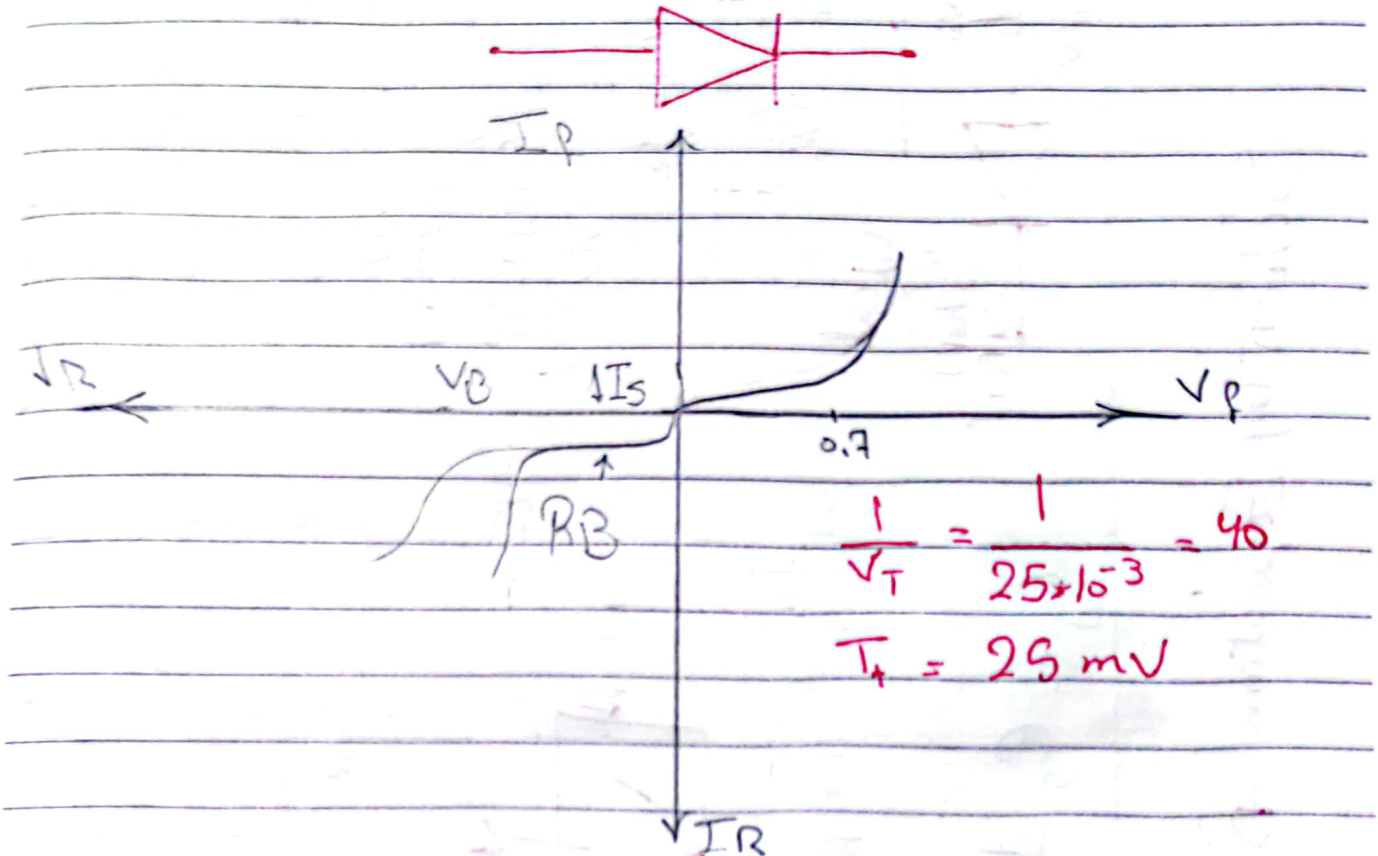
V - I characteristics of normal diode



$$\frac{1}{V_T} = \frac{1}{25 * 10^{-3}} = 40$$

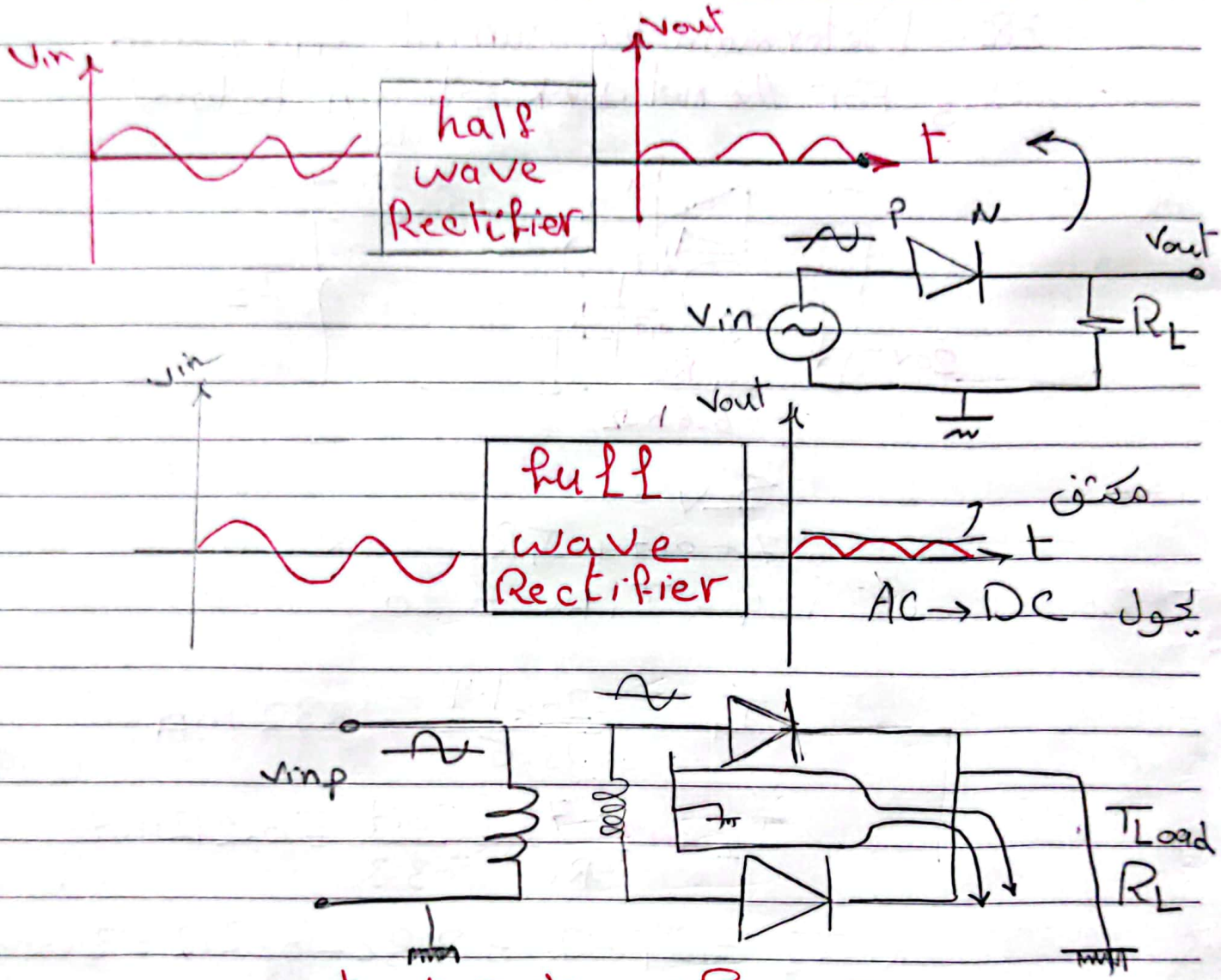
$V_T = 25\ mV$

$$I_D = I_S \left(e^{\frac{V_D}{2V_T}} - 1 \right)$$

$$= I_S \left(e^{-40V_D} - 1 \right)$$

$$I_D \simeq -I_S$$

Nawar



center tap transforrer
(full wave Rectifier)

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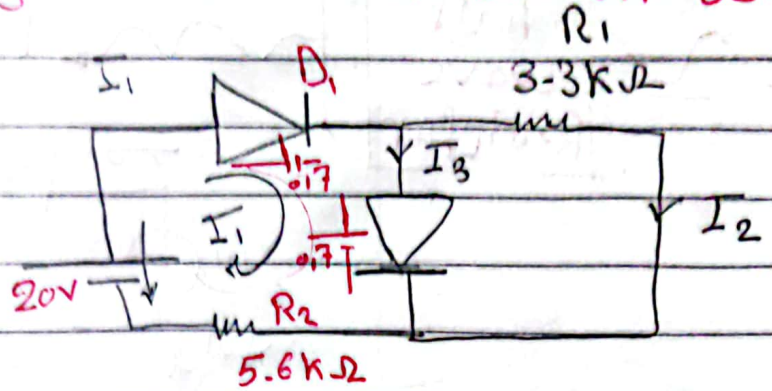
Ex:- Determain the current I_1, I_2 and I_3 For the network Shown below



$$\Sigma V = 0$$

$$0.7 + 0.7 + I_1 R_2 - 20V = 0$$

$$1.4 + I_1 R_2 = 20$$

$$I_1 = \frac{20 - 1.4}{5.6} = 3.32\ mA$$

$$I_2 = \frac{0.7}{R_1} = \frac{0.7}{3.3} = 0.212mA$$

$$I_3 = I_1 - I_2 = 3.32 - 0.212 = 3.108mA$$

ثابت

$$S_s = S_o S_r = (8.85 \times 10^{-14})(11.8)$$

For Si

$$q = 1.6 \times 10^{-19}$$