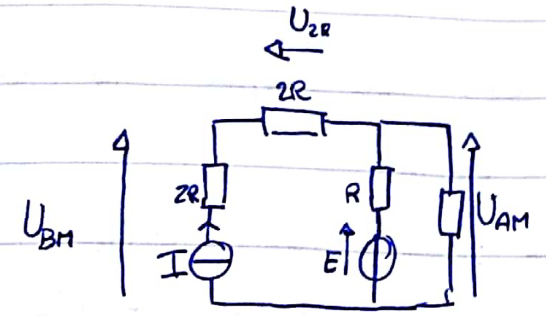
ELEC

Ex 2 :

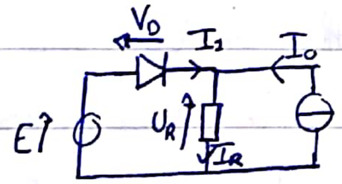


$$U_{AM} = \frac{I + \frac{E}{R}}{\frac{1}{R} + \frac{1}{R}} = \frac{I + \frac{E}{R}}{\frac{2}{R}} = \frac{RI}{2} + \frac{E}{2}$$

According to loop's law, $U_{BM} = U_{AM} + U_{2R}$

$$= U_{AM} + 2RI$$

Ex 3 :



We suppose the diode is on :

~~Node~~ Loops law : $E - V_D - U_R = 0$

$$V_D = E - U_R$$

because diode on, we also have $V_D = V_0$

so $I_R = \frac{E - V_0}{R} = 0{,}043\ A$

$$I_0 = I_R - I_1$$

$$I_1 = -0{,}017\ A$$

I_1 cannot be negative, so the diode is off.

Now with 30 mA, we suppose the diode is off:

$$I_o = I_R = 30\ mA$$

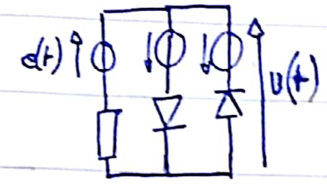
K. Loop's law : $E - U_D - (R \cdot I_R) = 0$

$$U_D = E - RI_R$$

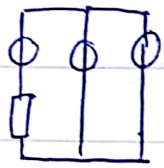
$$U_D = 2V$$

$2V > 0.7V$, so the diode is necessarily on.

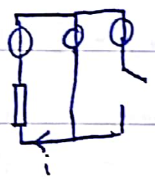
<u>Ex 4</u> :



1) We suppose both diodes are on :
The voltage for all three branches should be equal, but $E_1 \neq E_2$
so contradiction : D_1 and D_2 can't both be on.



2)



$$e(t) + E_1 - RI = 0$$

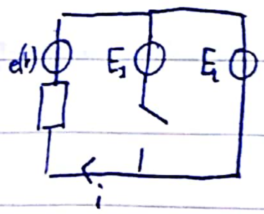
$$u(t) = -E_1$$

$$D_1 \text{ on} \iff i > 0$$

$$\frac{e(t) + E_1}{R} = I$$

for D_1 to be on, $e(t) > -E_1$ because $E_1 + e(t) > 0$

3)



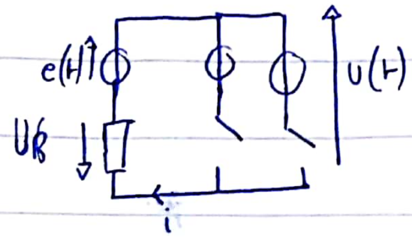
$$e(t) + E_2 - RI = 0$$

$$u(t) = -E_2$$

$$D_2 \text{ on} \iff i < 0$$

$$\frac{e(t) + E_2}{R} = I$$

for D_2 to be on, $e(t) < -E_2$ because $e(t) + E_2 < 0$

4) 

$$e(t) - U_R - u(t) = 0$$
$$u(t) = e(t) - U_R$$
$$u(t) = e(t) \quad \text{because } I = 0$$

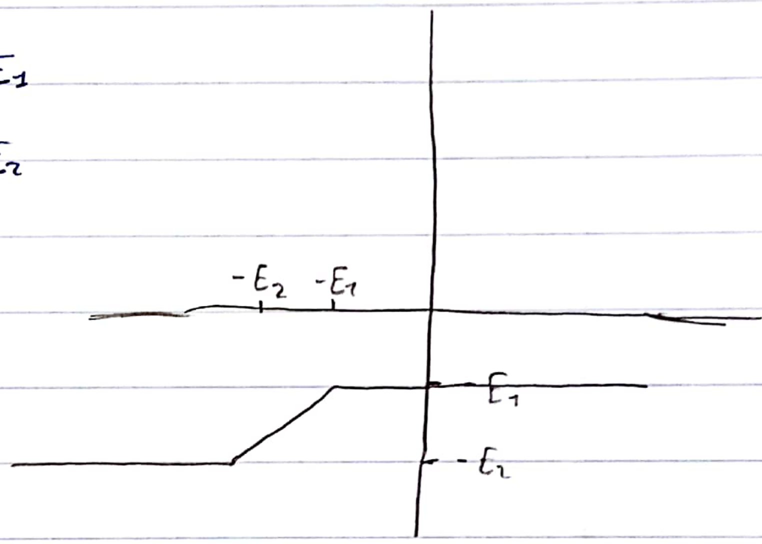
5) Using the negation of 3) and 4), we find that

D_1 off $\Leftrightarrow$ $i < 0$ $\Rightarrow$ $e(t) < -E_1$

D_2 off $\Leftrightarrow$ $i > 0$ $\Rightarrow$ $e(t) > -E_2$

so $-E_1 > e(t) > -E_2$

6)
$$u = \begin{cases} -E_1 & \text{if } e(t) > -E_1 \\ -E_2 & \text{if } e(t) < -E_2 \end{cases}$$



7)