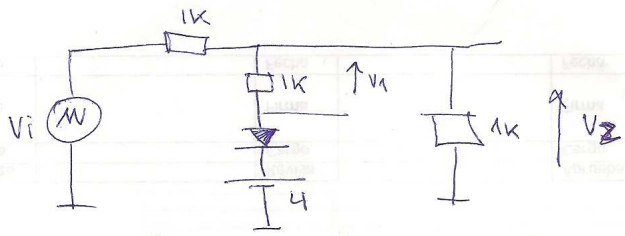
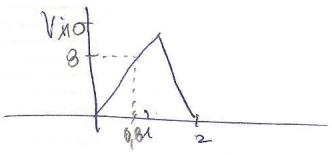
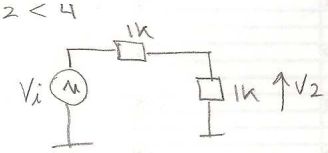
1-2008





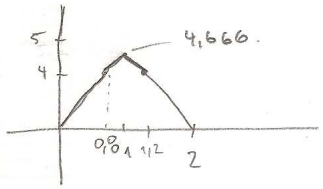
$V_2 = 4$ (V) Diodo empieza a conducir

$V_2 < 4$

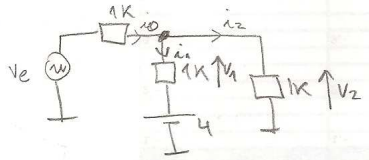


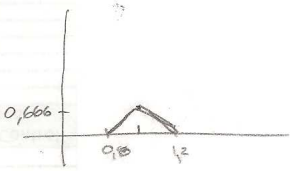
$$V_2 = \frac{V_i}{2}$$

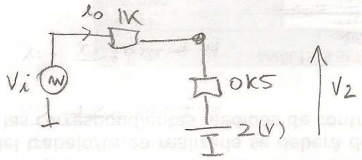
$V_1 = 0$



$V_i > 8$





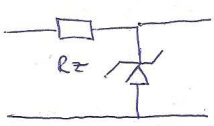


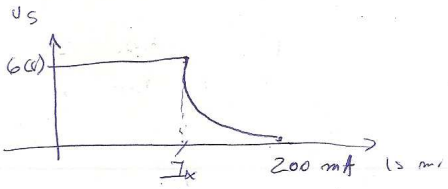
$$V_2 = \frac{(V_i - 2)\,0K5}{1K5} + 2$$

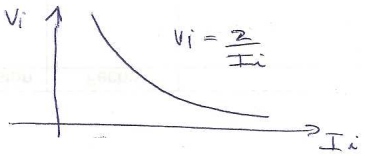
si $V_i = 10$ $\quad V_2 = \frac{8 - 0,5}{1,5} + 2$

$\boxed{V_1 = V_2 - 4}$

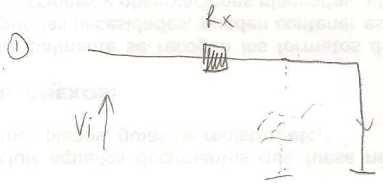
Regulador con zener







Calcular Rz e Ix [illegible]



$$Vi = \frac{2}{200mA} = 10\ [V]$$

$$Rz = \frac{Vi}{200mA} = \frac{10}{200mA} = 50\ [\Omega]$$

$$\frac{Vi - 6}{Rz} = Ix \rightarrow \frac{2}{Ix} - 6 = Ix\ Rz$$

$$50\,Ix - \frac{2}{Ix} = -6$$

$$50\,Ix^2 - 2 = -6\,Ix$$

$$5\,Ix^2 + 6\,Ix - 2 = 0$$

$Ix = -0{,}26$ (A)

$Ix = 0{,}148$

$Ix = 148\ mA$

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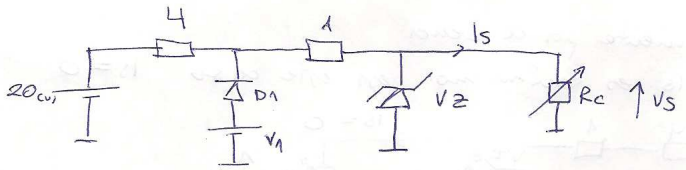
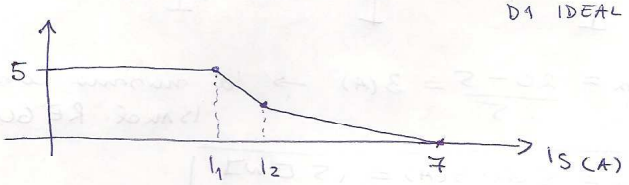


D1 IDEAL



a) V_1, I_1 e I_2 (Determinar)

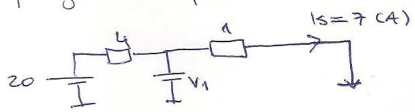
b) V_z y $P_{zmáx}$ del zener

Desarrollo

$I_s = 7$, Diodo zener no conduce (el zener conduce en la zona regulable)

D1 conduce?

(i) Supongamos que sí



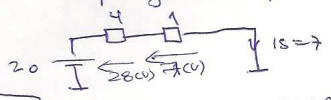
Circuito válido para:

$I_2 < I_s < 7$ (A)

$V_1 = I_s \cdot 1 = 7$ (V)

$\boxed{V_1 = 7 (V)}$

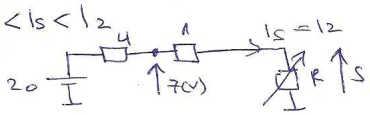
(ii) supongamos que no



¡LVK NO SE CUMPLE!

en I_2 ocurre la conmutación del diodo y D1 deja de conducir

$I_1 < I_s < I_2$



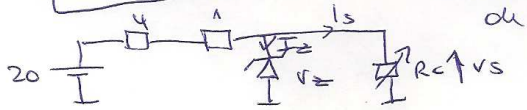
LVK: $\frac{20 - 7}{4} = I_2$ $\quad I_2 = \frac{13}{4} = 3{,}25$ (A) $\rightarrow$ $\boxed{I_2 = 3{,}25 (A)}$

Ahora Is empieza a disminuir aún más.

¿Que ocurre en Iz?

El Diodo zener entra en conducción inversa.

$V_z = 5\ (V)$ → el zener activa como regulador (mantiene un voltaje para valores de Is determinado $0 < I_s < 11$



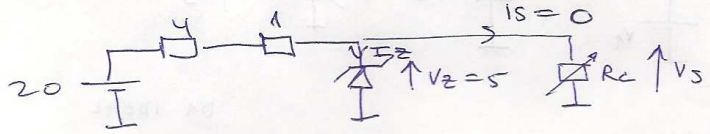
Cuando $I_z = 0$ (justo en la conmutación) $I_s = I_z$

LVK $I_s = \frac{20-5}{4+1} = \frac{15}{5} = 3\ (A)$ $\boxed{I_z = 3\ (A)}$

¿ $P_{z\,máx}$?

máxima corriente por el zener

Es cuando Is es mínimo en este caso $I_s = 0$



$I_{z\,max} = \frac{20-5}{5} = 3\ (A)$ → la misma corriente Is máx REGULADA.

$\boxed{P_{z\,máx} = 5\ (V) \cdot 3\ (A) = 15\ [W]}$

Atte AMM.