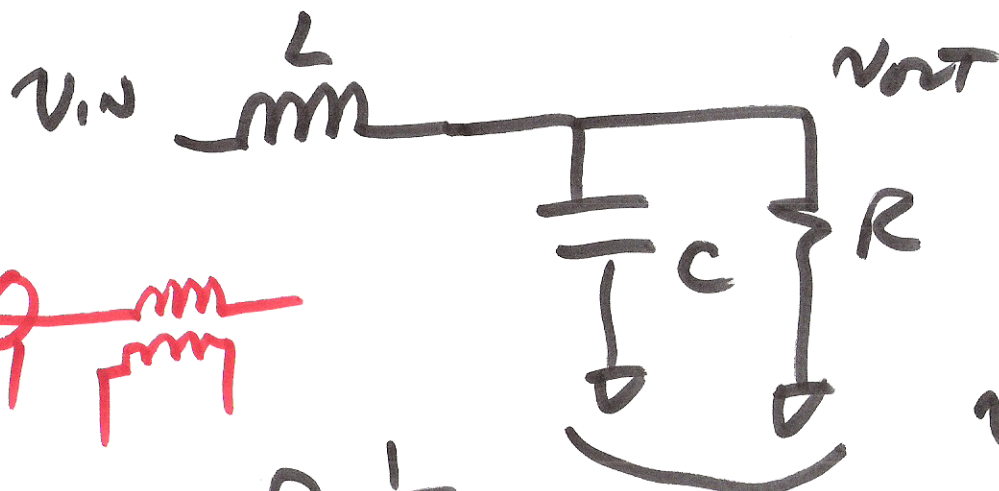


ECE 51472 Power Electronics

NOV. 17, 2011

Lecture 23



$$V_{OUT} = V_{IN} \cdot \frac{\frac{R}{1+j\omega RC}}{j\omega L + \frac{R}{1+j\omega RC}}$$

$$\frac{R \cdot \frac{1}{j\omega C}}{R + j\omega RC} = \frac{R}{1 + j\omega RC}$$

$$\frac{V_{OUT}}{V_{IN}} = \frac{R}{s^2 RCL + sL + R} = \frac{\frac{1}{LC}}{s^2 + s \cdot \frac{1}{RC} + \frac{1}{LC}}$$

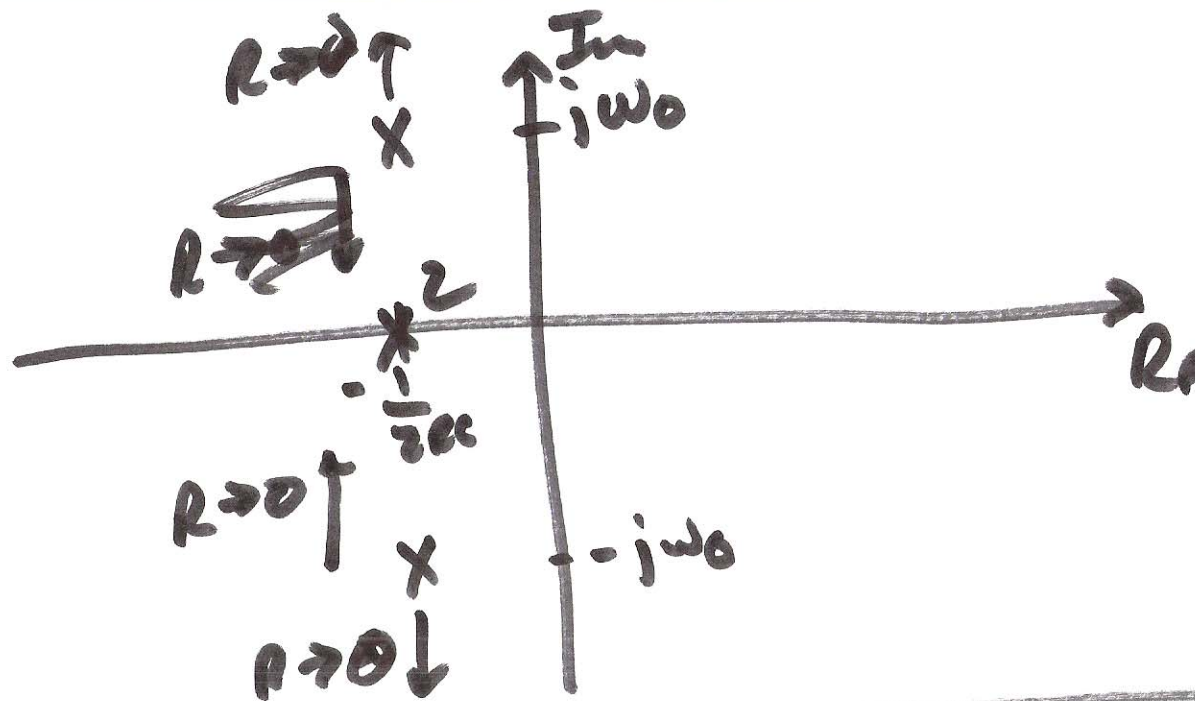
$$s^2 + s \cdot \frac{1}{RC} + \frac{1}{LC} = 0$$

$$s = \frac{-\frac{1}{RC} \pm \sqrt{\left(\frac{1}{RC}\right)^2 - 4 \cdot \frac{1}{LC}}}{2}$$

$$V_{OUT} = (1 + j0) \cdot$$

$$\frac{\frac{1}{LC}}{(j \cdot 2\pi \cdot 200\text{K}) + 200\text{K} \cdot j \frac{1}{RC} + \frac{1}{LC}}$$

1)



$$s_{1,2} = -\frac{1}{2RC} \pm \sqrt{\frac{1}{4R^2C^2} - \frac{1}{LC}}$$

$R \rightarrow \infty \nearrow \pm j \cdot \frac{1}{\sqrt{LC}}$
 ω_0

$$s_1 = |a + jb|$$

$$s_2 = |a - jb|$$

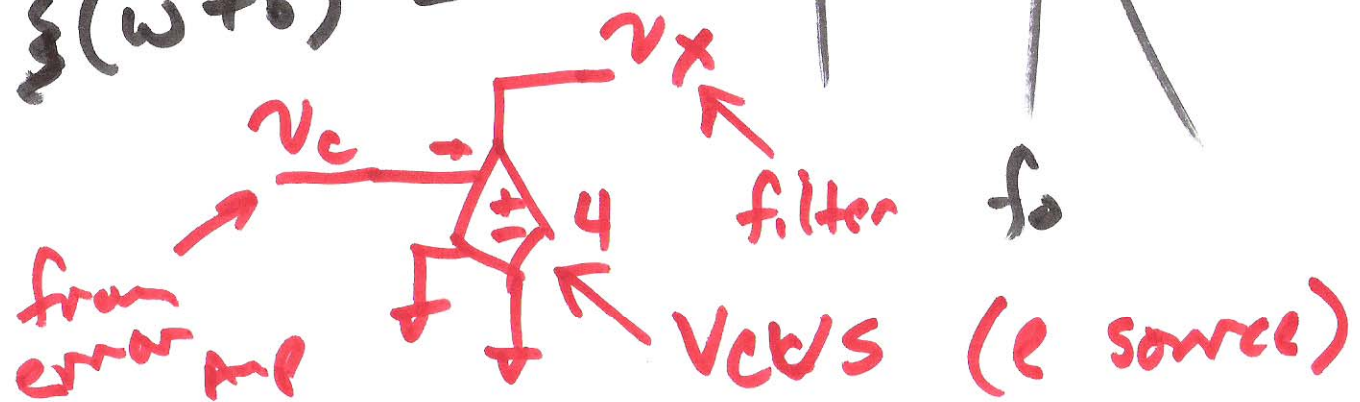
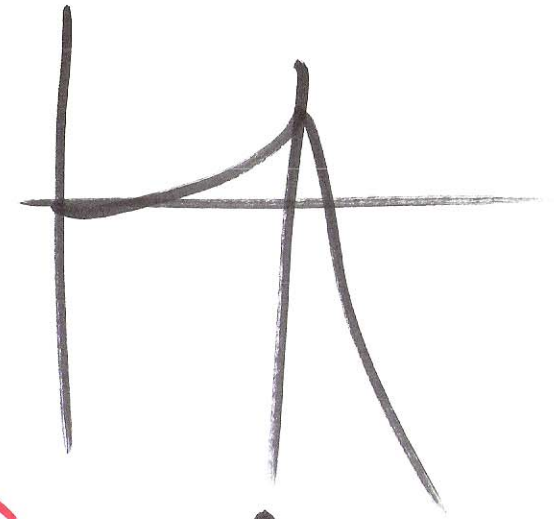
2)

$$\frac{1}{cc} \\ (s-a-ib)(s-a+ib)$$

$$(j\omega - a - ib)(j\omega - a + ib)$$

$$\xi(\omega - b) = a$$

$$\xi(\omega + b) = a$$

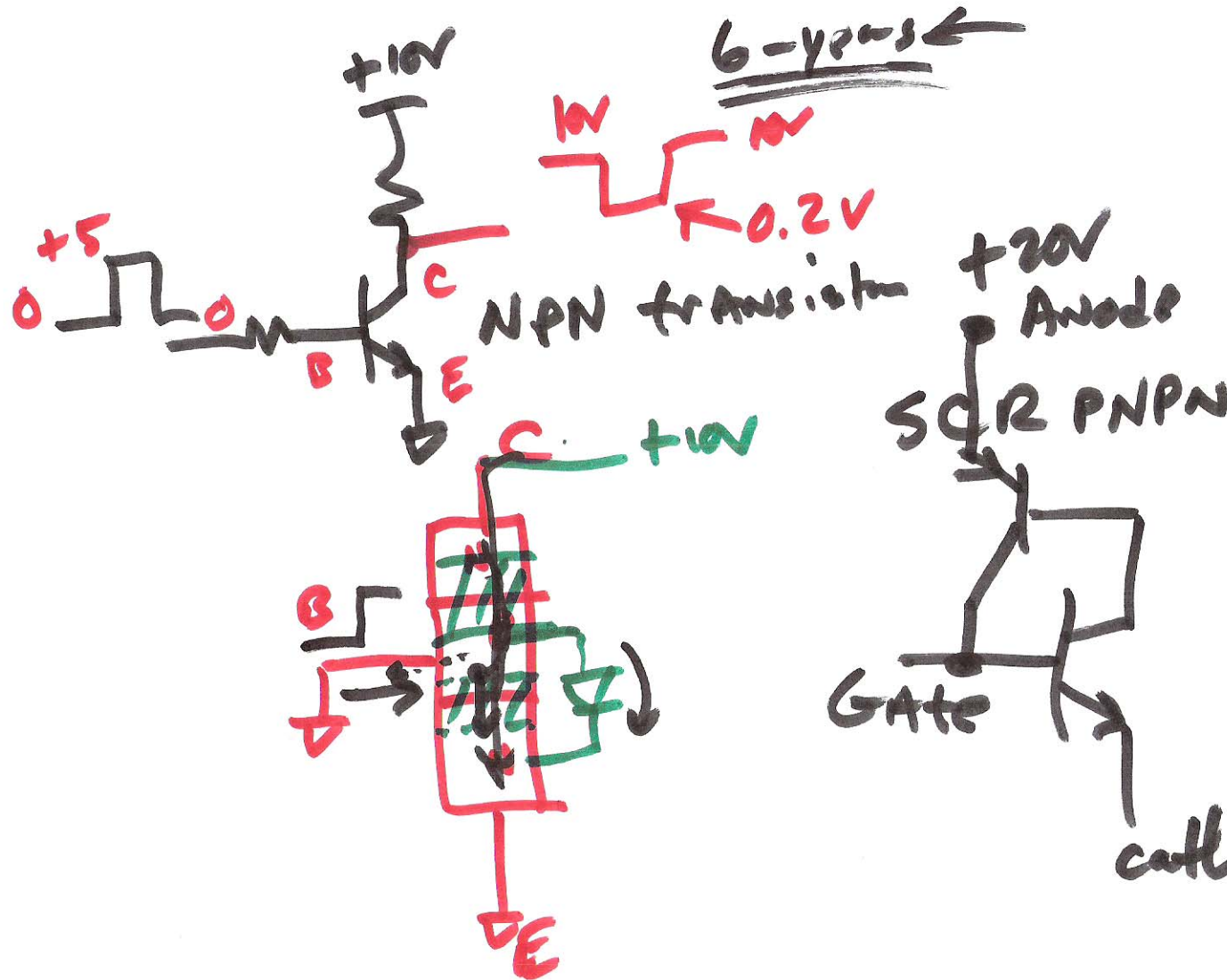


3)

May 2012 - Aug 2013

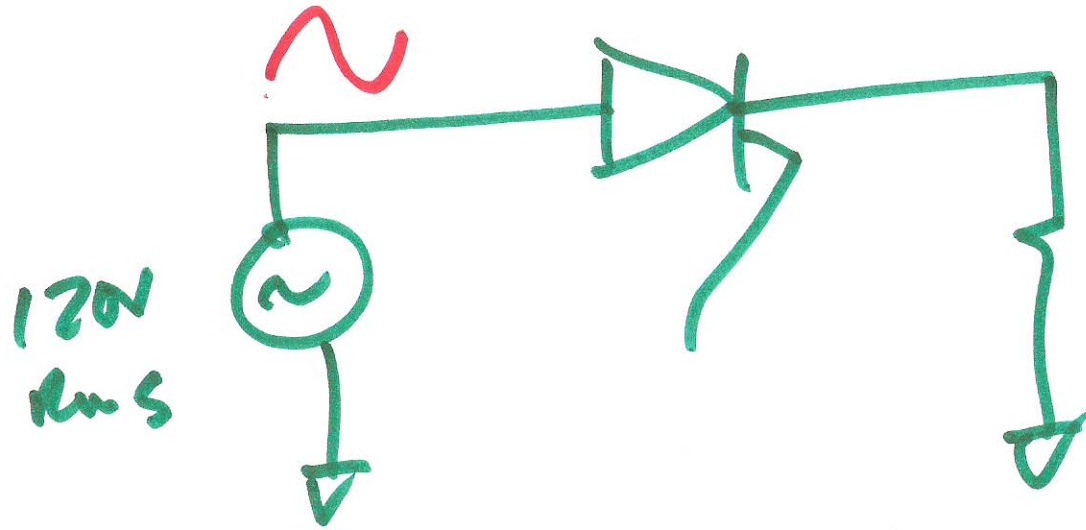
Silicon Controlled Rectifiers

overdaho.com

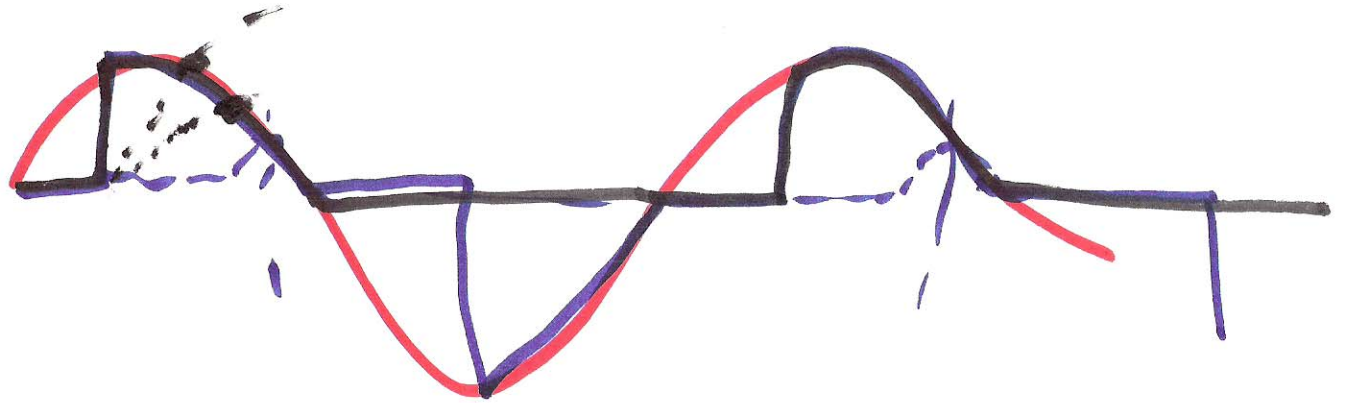
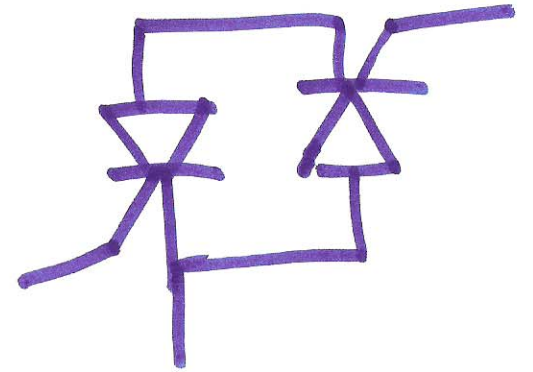


9-month
 $\frac{40,000}{2050} \cdot \frac{12}{9}$
 20.00

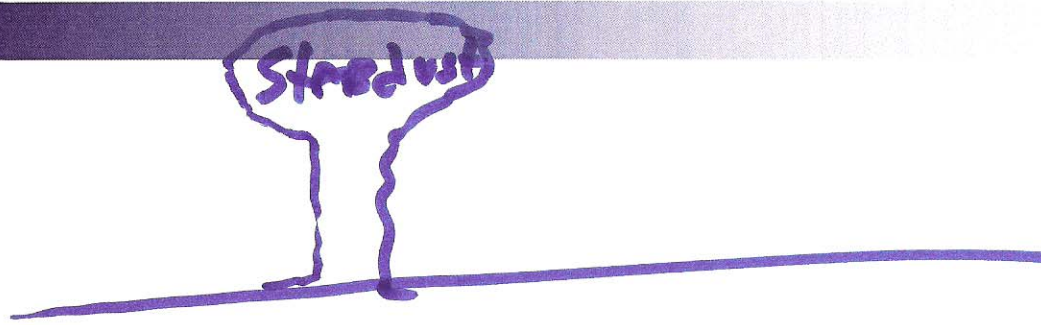
4)



triac

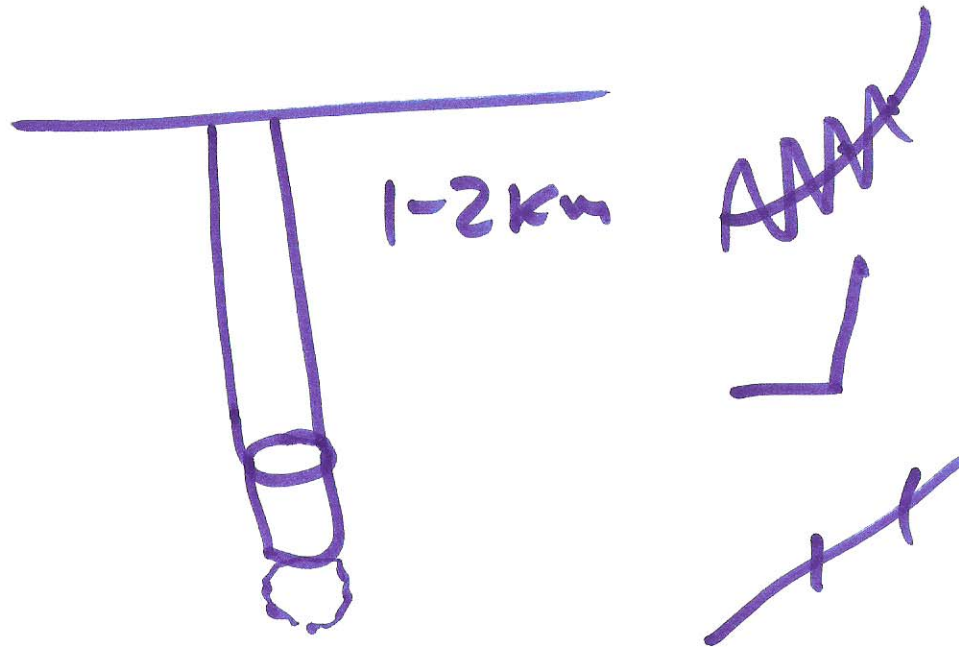


4)



4:00 AM RPOCO
7:00 AM E.G.E.G.

8/HR
85

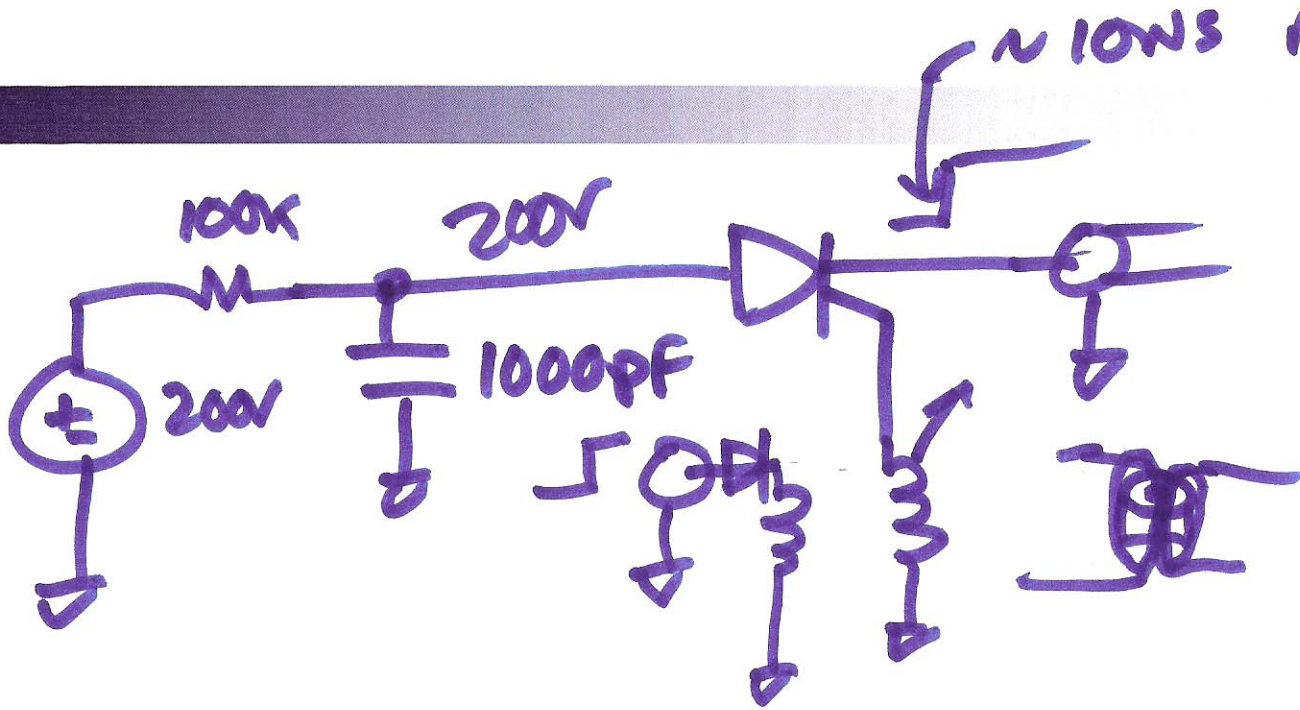


OD

10GHz

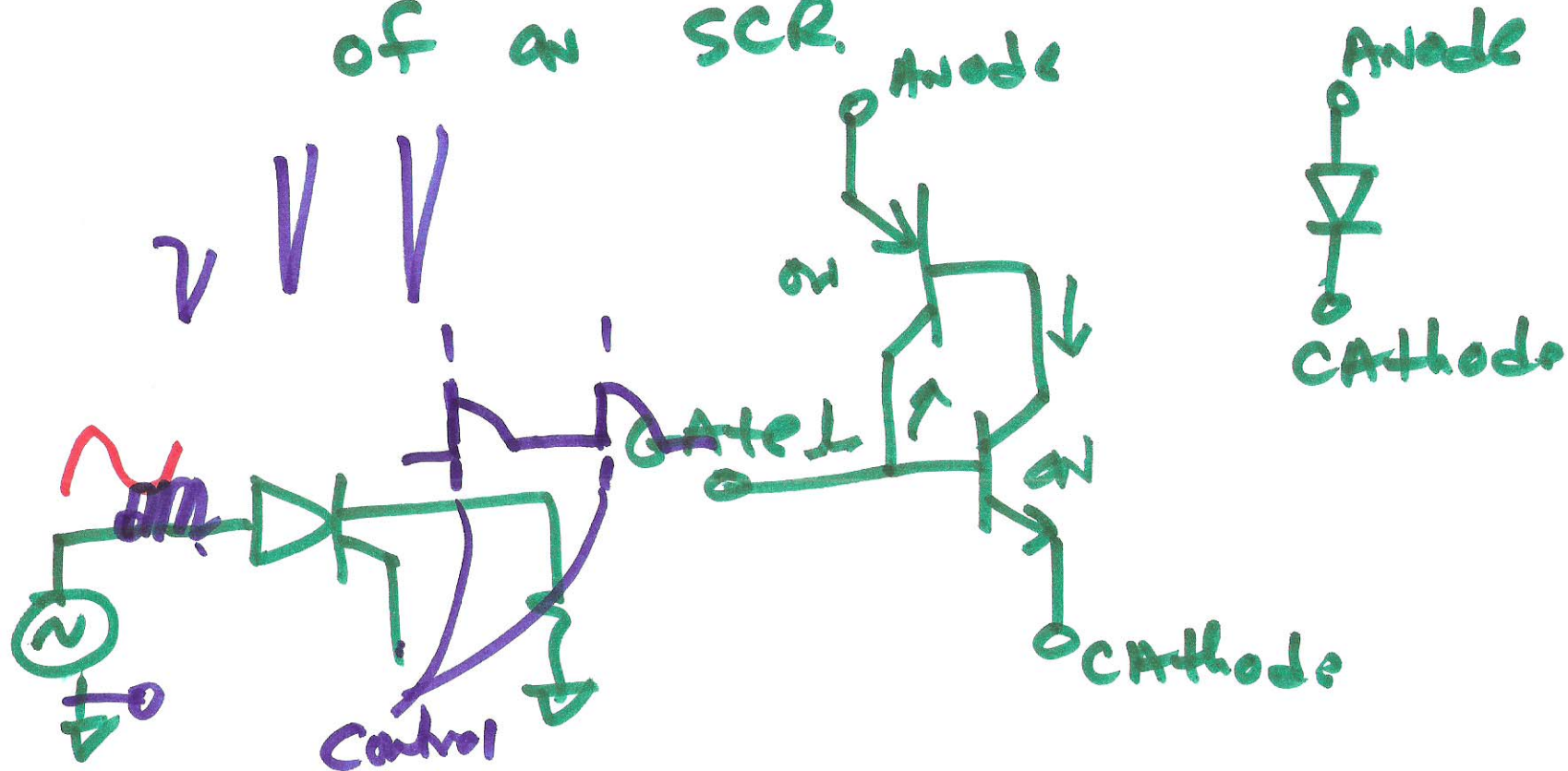
10V/m

7)



8)

Sketch the BJT equivalent of an SCR.



AT INSTANCES
1 & 2 triggers
SCR.

9)

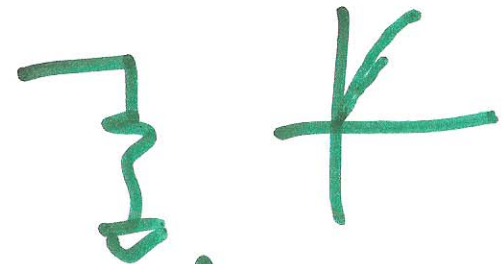
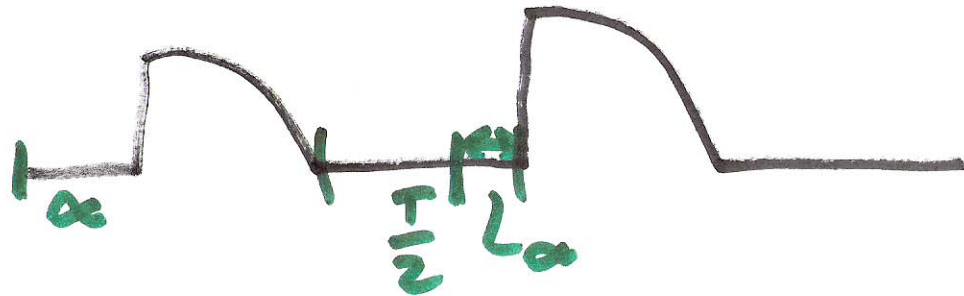
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$$V_{rms} = \frac{V_p}{\sqrt{2}}$$



$$V_{rms} = \frac{V_p}{2}$$



Average DC voltage across the resistor is

$$\frac{1}{T} \int_{-\infty}^{T/2} V_p (\sin 2\pi f t) \cdot dt \quad f = \frac{1}{T}$$

$$\frac{1}{T} \int_{-\infty}^{T/2} \left(V_p \cdot \sin \frac{2\pi}{T} \cdot t \right) dt \Rightarrow \frac{1}{T} \frac{V_p}{2\pi} \cos \frac{2\pi}{T} t \Big|_{-\infty}^{T/2}$$

10)

$$\frac{1}{T} \cdot \frac{TV_P}{2\pi} \cdot \cos \frac{2\pi}{T} \cdot t \Big|_{\alpha}^{T/2}$$

$$\frac{1}{T} \cdot \frac{TV_P}{2\pi} \left[t + \cos \frac{2\pi}{T} \alpha \right]$$

$$\frac{VP}{2\pi} (1 + \cos \omega \cdot \alpha)$$

11)