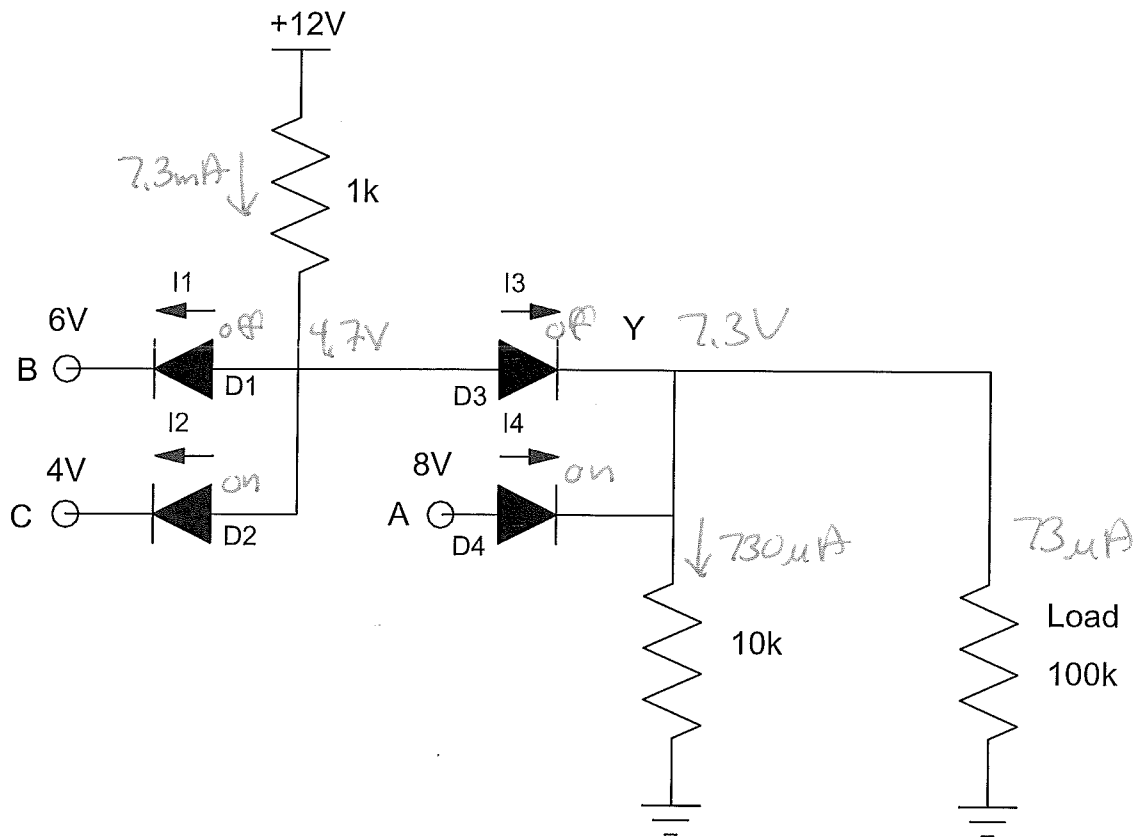


ECE 320: Quiz #4 Name _____

Max/Min, AC to DC, DC to DC - September 22, 2016

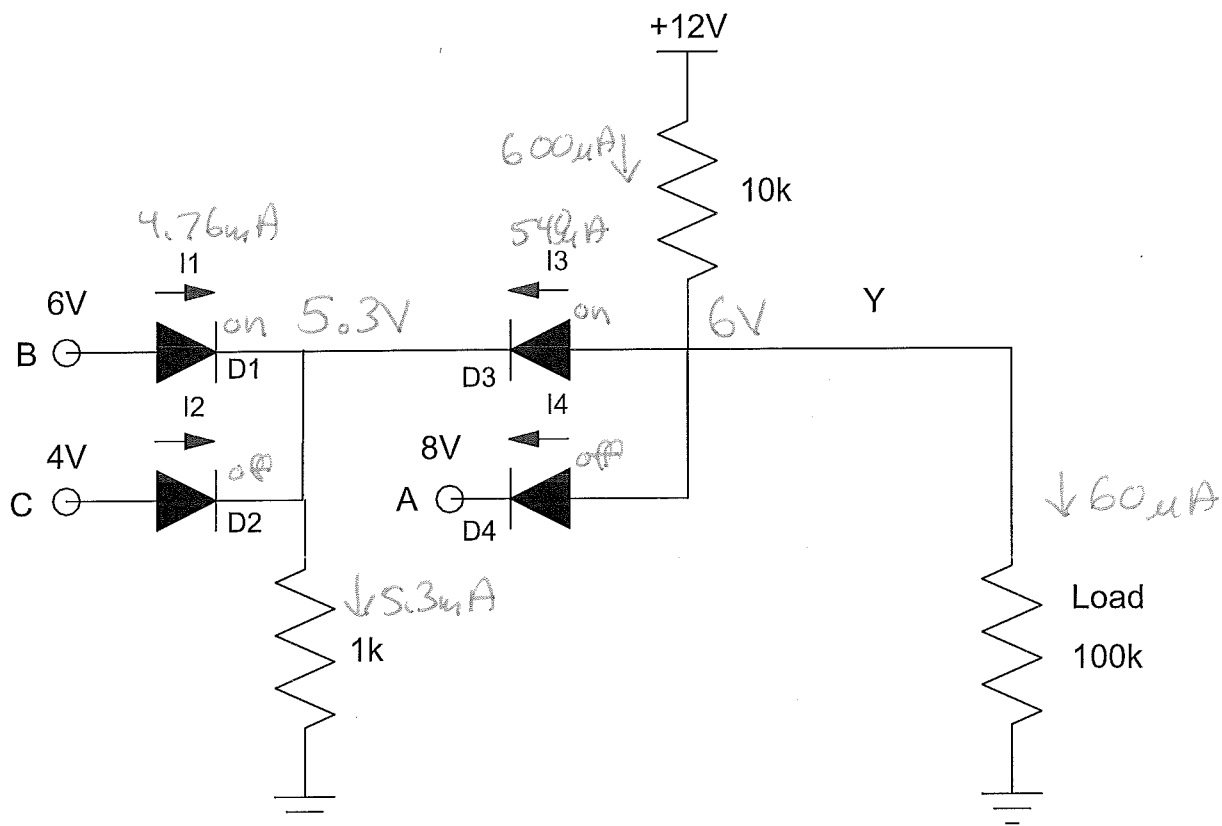
1) Assume ideal silicon diodes ($V_f = 0.7V$). Determine the currents I_1 , I_2 , I_3 , and I_4

I_1	I_2	I_3	I_4
0	$7.3mA$	0	$803\mu A$



2) Assume ideal silicon diodes ($V_f = 0.7V$). Determine the currents I_1 , I_2 , I_3 , and I_4

I_1	I_2	I_3	I_4
$4.76mA$	0	$540\mu A$	0

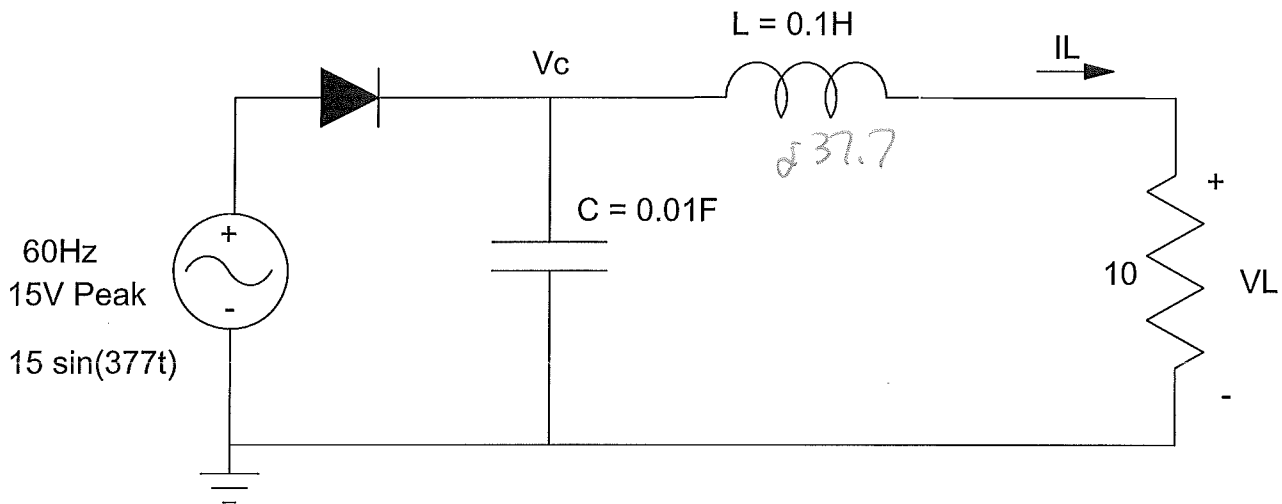


3) 1/2 wave AC to DC Converters. Find

- The peak voltage at V_c
- The peak-to-peak voltage at V_c (ripple)
- The peak-to-peak voltage at V_L (ripple)

V_c (peak)	V_c (peak-to-peak)	V_L (peak-to-peak)
14.3V	2.38 V _{pp}	611 mV _{pp}

$$\frac{1}{1 + j\omega L} \approx 0.256$$



$$I = C \frac{dV}{dt}$$

$$I \approx 1430 / 10 \Omega = 1.43 \text{ A}$$

$$1.43 = (0.01) \frac{dV}{460}$$

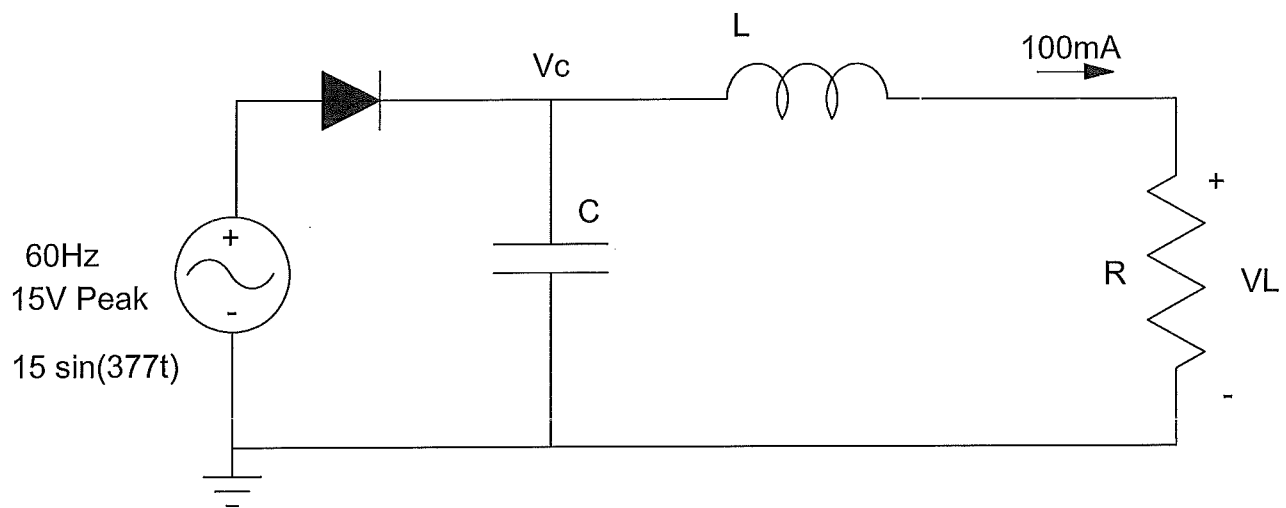
$$dV = 2.38 \text{ V}_{pp}$$

$$V_L = \left(\frac{R}{R + j\omega L} \right) V_c = (0.256) V_c = 611$$

4) Half-Wave AC to DC Converter: Design.

- Find R so that the current to the load is 100mA
- Find C so that the ripple at V_C is 500mVpp
- Find L so that the ripple at V_L is 100mVpp

R	C	L
143 Ω	3.33mF	1.89H



$$R = \frac{14.3V}{100mA} = 143 \Omega$$

$$I = C \frac{dV}{dt}$$

$$0.1 = C \frac{0.5}{460}$$

$$C = 3.33 \text{ mF}$$

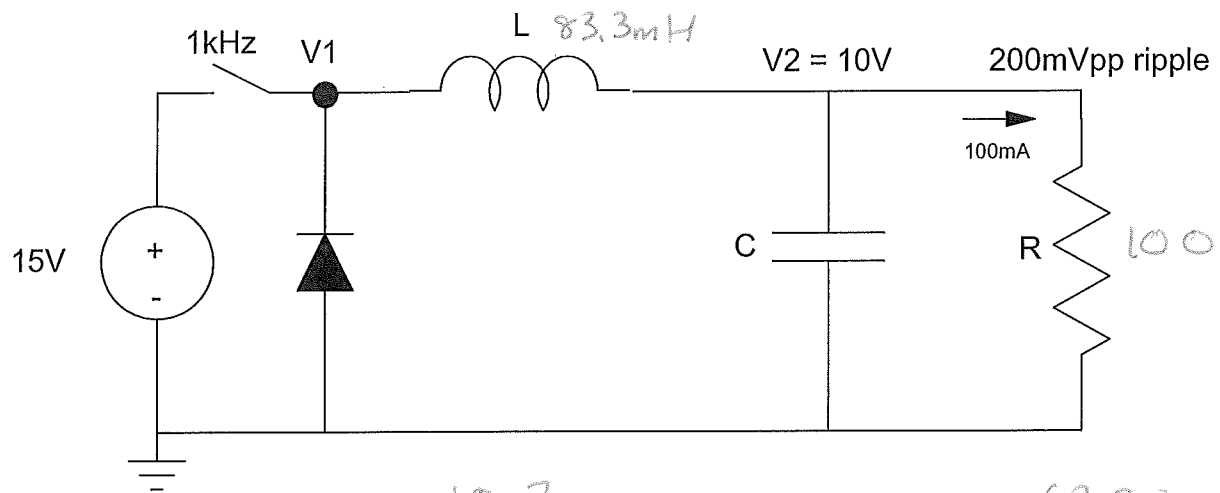
$$j\omega L = 5 \cdot R$$

$$L = \frac{5 \cdot 143}{377}$$

$$L = 1.89 \text{ H}$$

5) A Buck converter is used to reduce 15VDC to 10VDC with 200mVpp ripple. Determine the following

Duty Cycle	R load = 100mA	L 3Vpp ripple at V2 if C = 0	C 200mVpp ripple at V2
68.1%	100	83.3mH	23.9μF



$$\text{duty cycle} = \frac{10.7}{15.7} = 68.1\%$$

$$\omega = 6280 = 2\pi f$$

$$\omega L = \left(\frac{15.7 \text{Vpp}}{3 \text{Vpp}} \right) 100 \Omega$$

$$L = 83.3 \text{mH}$$

$$\left(\frac{1}{\omega C} \right) = \left(\frac{1}{15} \right) \cdot 100 \Omega = 6.67 \Omega$$

$$C = 23.9 \mu\text{F}$$

Bonus: Bernie Sanders Trivia!!! Which has a greater impact of the economy and why:

- A single person making \$50 million / year
- 1000 people, each making \$50,000 / year.

Reagonomics: One person making \$50m

~~There were 6 people out of~~

The wealthy are the job creators. By giving them more money, more jobs are created benefitting everyone.

"Trickle down economics"

Robert Reich: One thousand people making \$50k

70% of our economy is consumerism.

1000 people will buy 1000 houses, 1000 beds, 1000 cars, make 1000 meals a day, send 1000 kids to schools. This creates demand for products and which creates jobs.

1 person only buys 1-3 houses. The wealthy are actually job killers.

The reason income isn't rising is too much ~~use~~ wealth is locked up in the top 1% leaving little left over to drive the economy.

6
votes

17
votes