Quiz Review

Question 1 – Circle the components that are responsible for the regulation in the circuit above.

The two transistors and the Zener diode.

One of the transistors amplifies the effect of the Zener diode. The Zener is the weak link in the circuit since it can't handle a lot of current. The TIP42 transistor is run in common base; this transistor is a pass transistor; it is passing the current required. The current passed is regulated by the base, and the base is controlled by the 2N3906 transistor and the Zener diode. The 2.2 ohm resistor is just a current limiter.

We see a feedback loop using the 2N3906. Any change on the output reflects into the base of the TIP42. The 2N3906 amplifies any change.

The 10 K resistor is a current-limiting resistor to protect the Zener diode, and also is a load resistor for the amplification resistor. If there was an open circuit instead of the 10K resistor, all the current in the regulation circuit would flow through the Zener diode and possibly burn out the Zener diode.

Why would we need a negative voltage? For example, a motor control circuit to change the direction of the motor. Computers typically need +12, +5, and -12 volts DC.

Question 2 – What is the purpose of the .01 microfarad capacitor at the output?

It bypasses high frequencies that might appear on the 12 volt line. Having the combination of a big and small capacitor on a power supply output is common. The small capacitor might bypass high frequencies generated by the regulation circuit, or it might bypass high frequencies created in the circuit fed by the power supply

Question 3 – What type of diode is the 1N4742A?

Zener.

Question 4 – What is the voltage at the minus side of the 2200 microfarad capacitor?

It is 17.2 volts. 25.2 volts, center tapped is RMS. A full-wave rectifier circuit splits the secondary, so the secondary output is 12.6 V RMS. Subtract off the 0.6 to 0.7 volts for one diode per half of the cycle. Convert RMS to peak by multiplying by 1.414, since the capacitor will charge to peak voltage.

I'm not sure if you subtract the diode drop before or after converting the voltage from RMS to peak.

Question 5 – We are assuming what input voltage to the primary of the transformer?

120 VAC

Question 6 – What components do regulation in the circuit above?

The 7805.

Question 7 – What is the meaning of vct?

Volts, center tapped.

Question 8 – What type of rectifier is used in both circuits?

Full-wave.

Question 9 – What is the 7805?

A voltage regulator. The 78 indicates it is positive (79 indicates negative). The 05 indicates 5 volts.

Question 10 – What type of diode is the diode connected to the +5V through a 470 ohm resistor?

LED (light-emitting diode).

Round-table for the CCU Question on How CCU Protects Operators from Electrocution

There is 30 volts on the line at first.

What is D25? An optoisolator. The LED is in a package, and can't see the LED. When the LED generates light (infrared), it affects the base of the associated transistor.

The T2 DC to DC converter seems like a paradox, since it is a transformer and transformers don't pass DC. However, the drive current is AC as fed to T2, and that makes the voltage vary at the primary of T2, which allows the DC to pass through by combining with the AC.

Work On Semester Projects

Or work on maintenance lab.