PHY 218
Quiz II

1. Take $V_{CC} = V_{BB} = 15v$, $R_C = 3.3K\Omega$
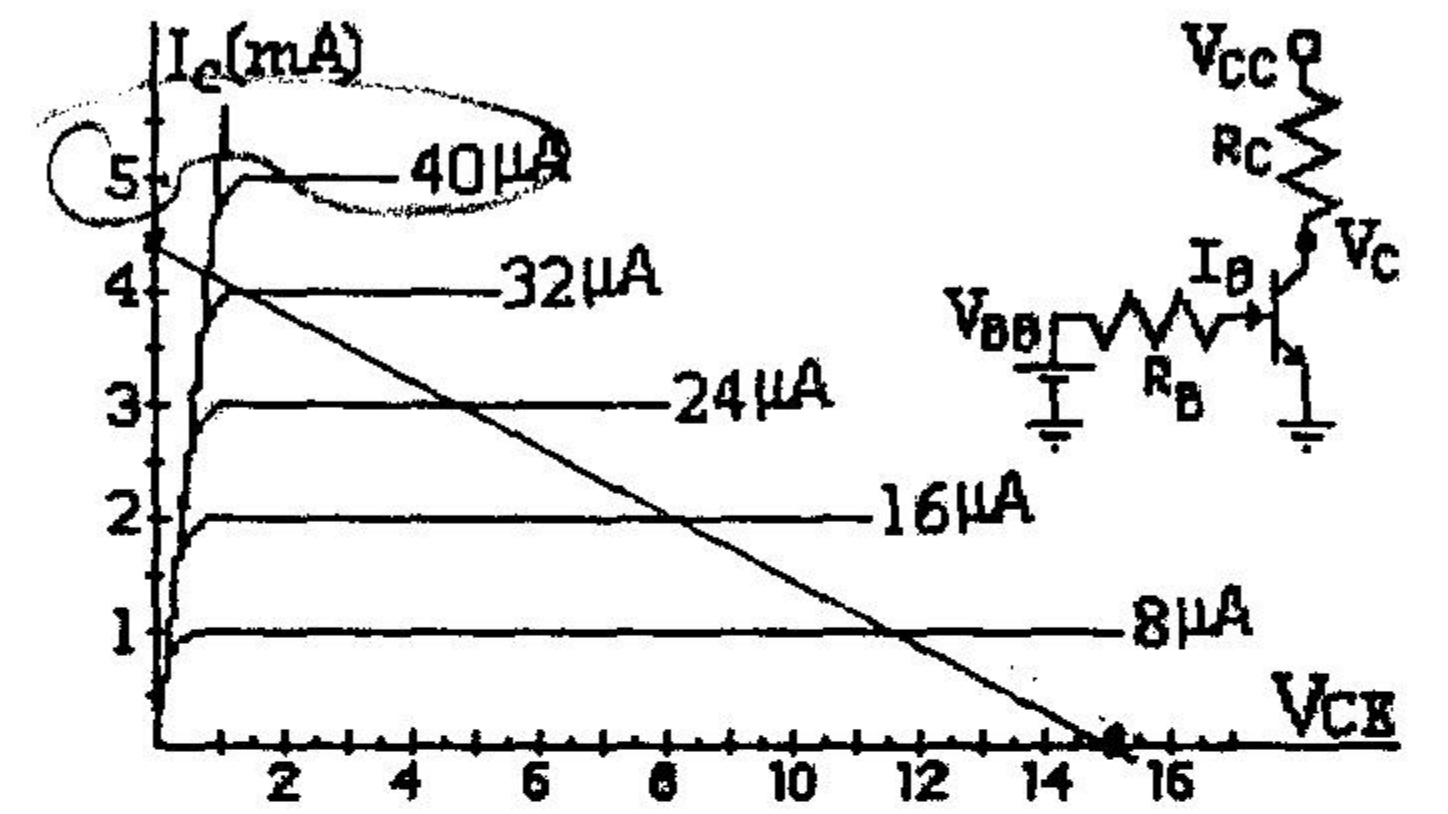
 a. Estimate β using the I-V curve $\beta = 125$ *(3 pts.)*

 b. Draw the Load Line $V_{CC} = 15v$ $\frac{V_{CC}}{R} = 4.54 mA$ *(4 pts.)*

 c. What is the value of I_B for the $V_C = \frac{1}{2} V_{CC}$? *(5 pts.)* $I_B = 12\mu A$

 d. Calculate R_B 412.5 *(4 pts.)*

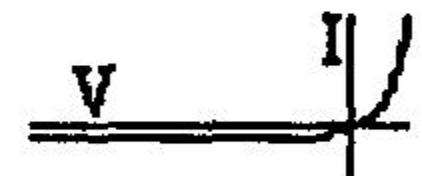 e. Replace the transistor with its model and draw the ac equivalent circuit $??$ *(5 pts.)*

Note: *Answering part b on this sheet.*

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2. Answer 7 of the following 11 questions briefly. *(7x7 = 49 pts.)*
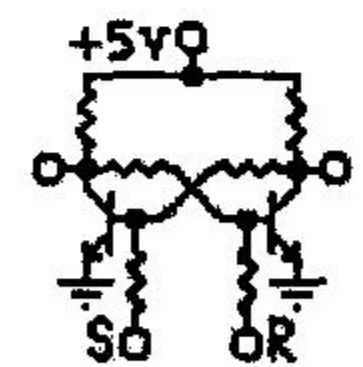 *The 8th answer will be ignored.*

 a. Why is the reverse current in a diode independent of voltage? (see figure)

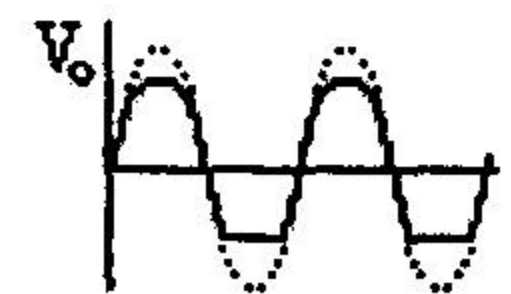 b. Why are some voltage regulator chips screwed to metal plates?

 c. What is the difference between energy bands of metals, insulators and semiconductors?

 d. Identify the two transistor circuit opposite. What do S & R stand for?

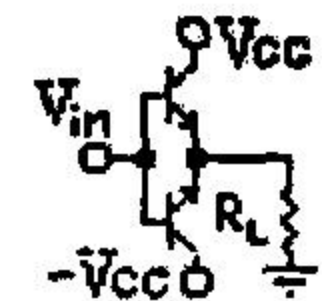 e. How does a varactor diode function?

 f. Explain the distortions in the amplifier output (Vo) shown to the right

 g. Why aren't Intrinsic semiconductors used in electronic gadgets like radios?

 h. Why does C_E increase the gain?

 i. Why is the two transistor amplifier shown energy efficient?
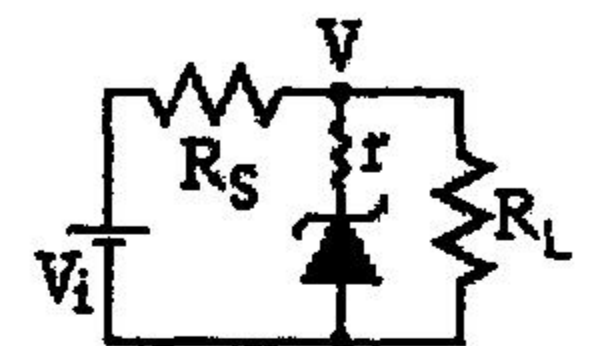
 j. Is the current in a photocell proportional to the intensity of light in the open circuit ($I \sim 0$) or the short circuit ($V \sim 0$) mode?
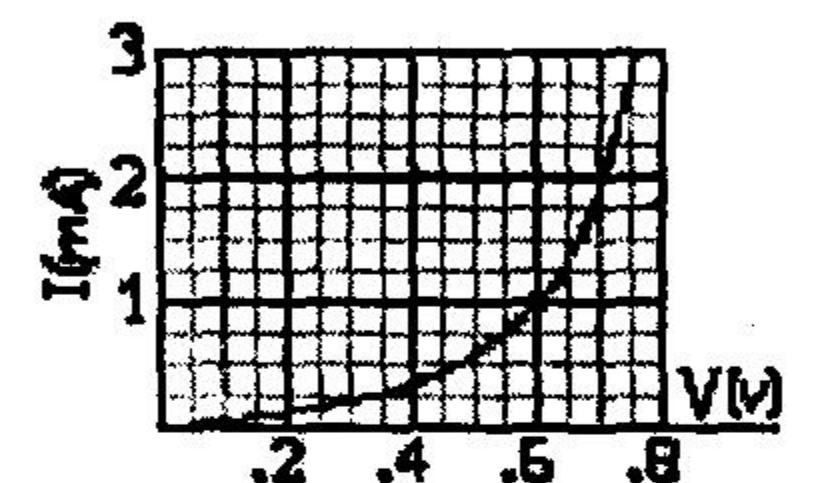
 k. What is the role of the capacitors at the I/O of transistor amplifiers?

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3. **Answer 3 of the following 4 questions.** *(3x10 = 30 points)*
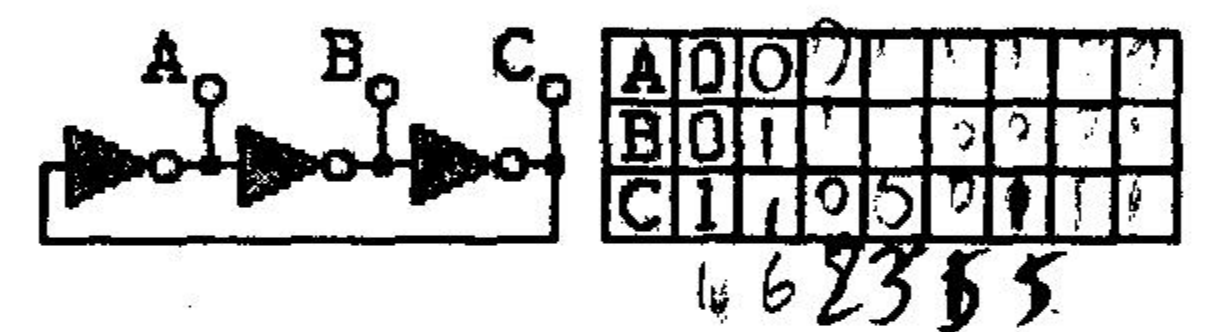
 3A. Take $V_{ZO} = 6.25v$, $R_S = 25\Omega$, $R_L = 100\Omega$, and $r = 5\Omega$
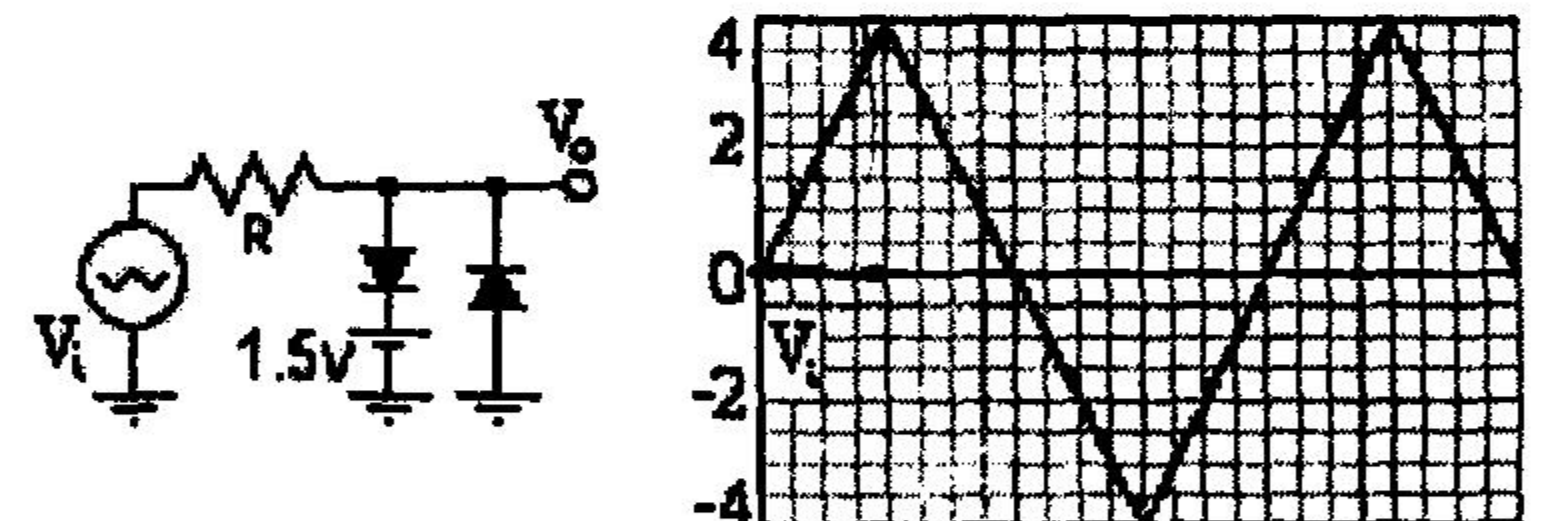 Calculate V for Vi = 25v $11.25 V$

 3B. Calculate the a.c and D.C. resistances at the highlighted point of the I-V characteristic curve of a diode shown to the right.

 3C. Continue the sequence of ABC for the cascade shown. What is its "illegal cycle?

 3D. The figure shows a clipper circuit and the waveform for Vi. Take $V_D = 0.5v$ and draw V_o *on the same graph.*

Good Luck!

$21 + 49 + 30 = 100$