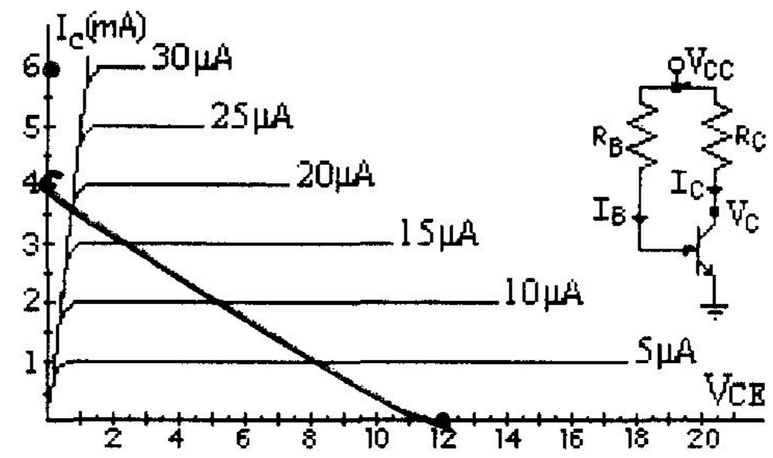
H.U. Fall 2009

Name: ----------

PHY 218
Quiz II

1. Take V_{CC} = 12v, V_{BE} = 0.6v, and R_C = 3 KΩ



a. Estimate β using the I-V curve *(4 pts.)*

b. Draw the Load Line (on this sheet) *(5 pts.)*

c. What is the value of I_B for the $V_C = ½ V_{CC}$? *(4 pts.)*

d. Calculate the value of R_B such that $V_C = ½ V_{CC}$ *(4 pts.)*

Bonus: What is the value of the nearest commercial resistor?

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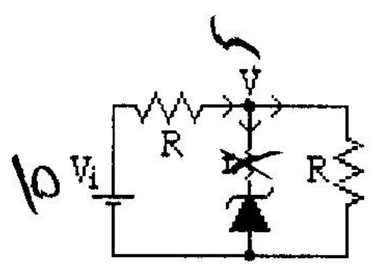
2. Take V_{zo} = 6v, R = 200Ω, and r = 25Ω.



a. Show by direct substitution that V = 6.8v when V_i = 20v *(8 pts.)*

b. Show that for part a above P_z = 0.22 w *(5 pts.)*

c. Argue that for V_i = 10v , we will have V = ½V_i = 5v *(4 pts.)*
Note that "argue" means that very little calculation is necessary

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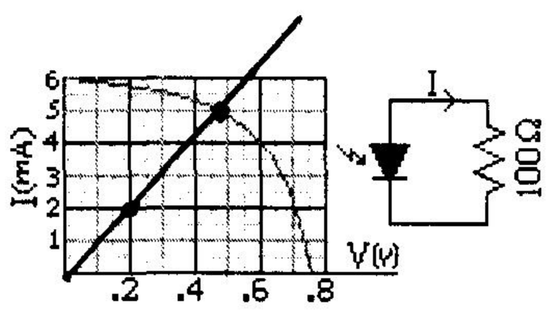
3. The figure shows a circuit and the I-V characteristic of the photocell.



a. Draw the load line and calculate the value of the current I *(7 pts.)*

b. Why isn't this diode operating in its linear mode? *(5 pts.)*

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4. Answer 8 of the following 11 questions briefly. Include a diagram wherever appropriate . *(8x7 = 56 pts.)*

Note: The 9th answer will be ignored.

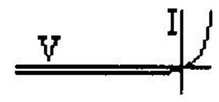
a. Why does a p-n junction have capacitance?

b. Why does the Ripple Factor (~ $1/fCR_L$) decrease for large load resistance (R_L) ?
Note that the formula is already given. No points for saying inversely proportional

c. Why will there be no current unless photons reach the depletion zone of a photodiode?

d. When will the gain of an amplifier be given by the expression G = A/(1 + bA) ?

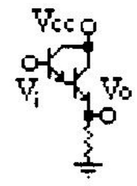
e. Why is the reverse current in a diode independent of voltage?(see figure)



f. Which factor determines the maximum current (I_z^{max}) of a Zener Diode?

g. How does a Varactor diode function? Mention an application.

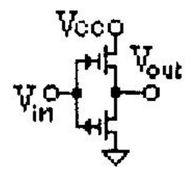
h. Identify the circuit shown and mention a use.



i. Why does C_E increase the gain of an amplifier?

j. Give the physical reason why I_B is a small percentage of I_C ($I_B/I_C = 1/\beta \sim 1/100$)

k. Identify the circuit shown and mention a use.



Good Luck!

2x17 + 12 + 56 = 102