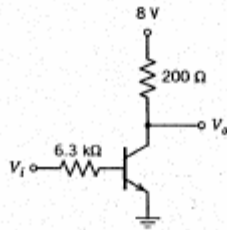
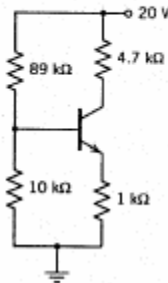


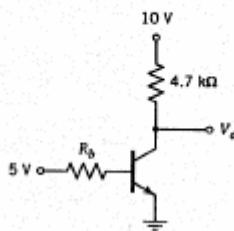
3-7. The transistor shown in the circuit has the characteristics given in Figure 3.1. Plot over the range $0 \text{ V} \leq V_i \leq 4 \text{ V}$, V_o versus V_i .



3-10. Calculate the collector and base currents in the silicon transistor shown. Assume $\beta_F = 75$. *Hint:* Make a Thévenin equivalent of the circuit connected to the base of the BJT.

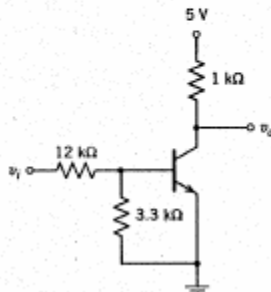


3-12. Determine the maximum value of the resistor R_B for which the transistor remains in saturation. Assume a silicon BJT with $\beta_F = 150$.



3-18. The simple logic inverter shown is constructed using a silicon BJT with $\beta_F = 75$.

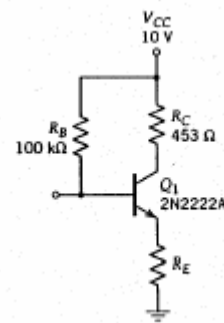
- What is the maximum input voltage v_i for which the output will be HIGH ($\approx 5 \text{ V}$).
- What is the minimum input voltage v_i for which the output will be LOW ($< 0.2 \text{ V}$).



3-16. Complete the design of the fixed-bias BJT circuit shown, given $I_B = 60 \mu\text{A}$. Determine the resistance value for R_E . What is the transistor Q point? That is, find:

- Collector-emitter voltage
- Collector current
- Base-emitter voltage

Assume that the transistor is a 2N2222A npn BJT as shown in Figure 3.1-1.

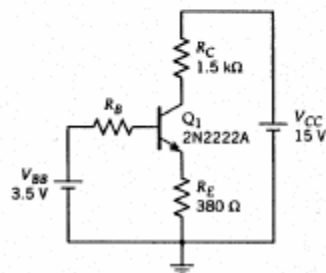


2N2222A
BETA=200

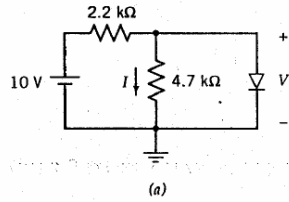
3-27. Complete the design of the circuit shown for $I_C = 5.3 \text{ mA}$. Determine the resistance values for R_B . Find the transistor currents and voltages using load line analysis:

- Collector-emitter voltage
- Base current
- Base-emitter voltage

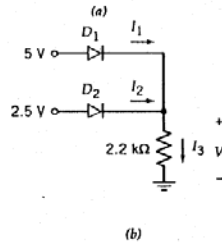
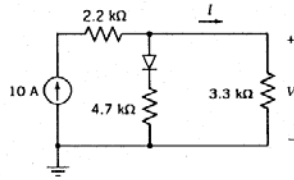
Assume that the transistor is a 2N2222A npn BJT as shown in Figure 3.1-1.



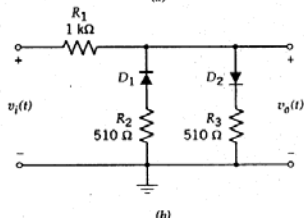
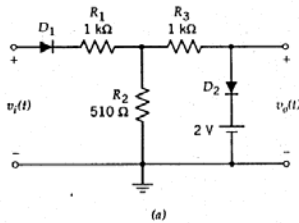
2-14. Find the values of I and V for the circuits shown. Assume that the diodes are ideal.



2-15. Find the values of all currents I and voltage V for the circuits shown. Assume that the diodes are ideal.



2-23. For the given circuits, plot the output voltage against the input voltage. Assume silicon diodes.



2-22. The diodes in the circuit are modeled by a simple model:

$$V_{\gamma} = 0.7, \quad r_d = 0, \quad r_r = \infty.$$

Sketch the transfer characteristic for $-25 \leq v_i \leq 25$ V. In each region indicate which diode(s) are on. Also indicate all slopes and voltage levels on the sketch.

