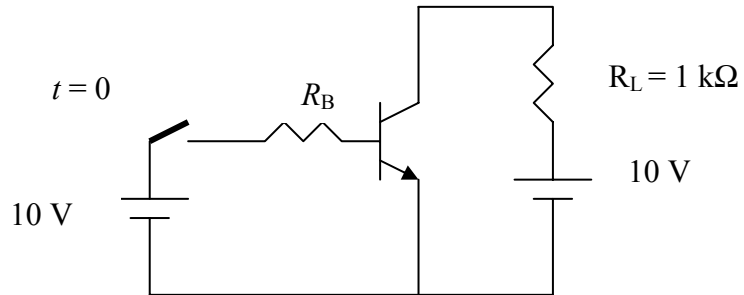


**ECSE-2210 Microelectronics Technology**  
**Class Activity 22**

The material for this class activity can be found in Chapter 12, pp 449-458.

The npn switching transistor used in the circuit below has the following parameters: Minority carrier lifetime in base,  $\tau_B = 100$  ns;  $\beta_{dc} = 50$ . Assume  $\gamma = 1$ . Answer the following questions.



Assume  $R_B$  is  $100\text{ k}\Omega$ . At  $t = 0$ , the switch is turned on. (i.e., the base current increases from 0 to approximately to  $0.1\text{ mA}$  at  $t = 0$ ).

- a. Will the transistor be in saturation or forward active mode for  $t \gg 0$ , i.e.  $t = \infty$ ? What will be the final value of the collector current?
- b. Calculate and plot the charge stored in the base,  $Q_B$  as a function of time, for  $t > 0$ .
- c. Plot the collector current as a function of time for  $t > 0$ .

