

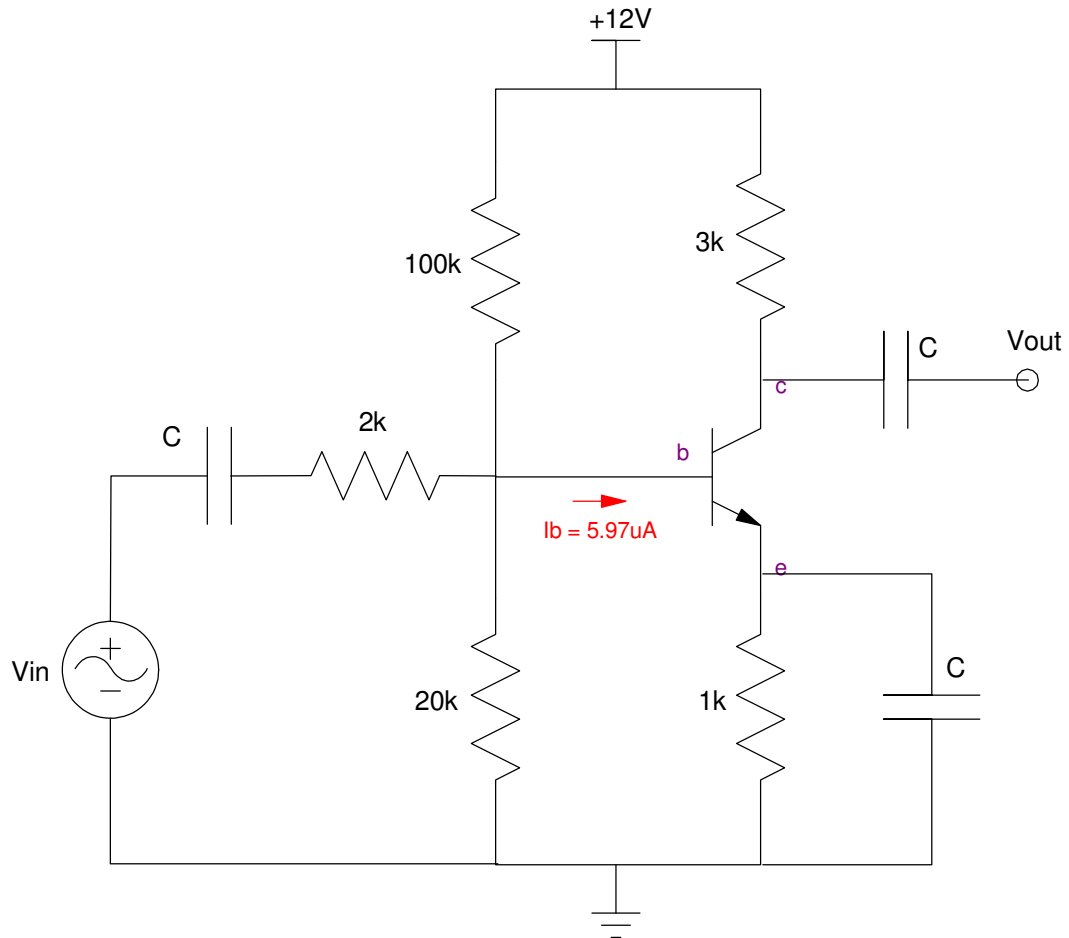
ECE 321: Handout #14

Common Emitter Amplifiers

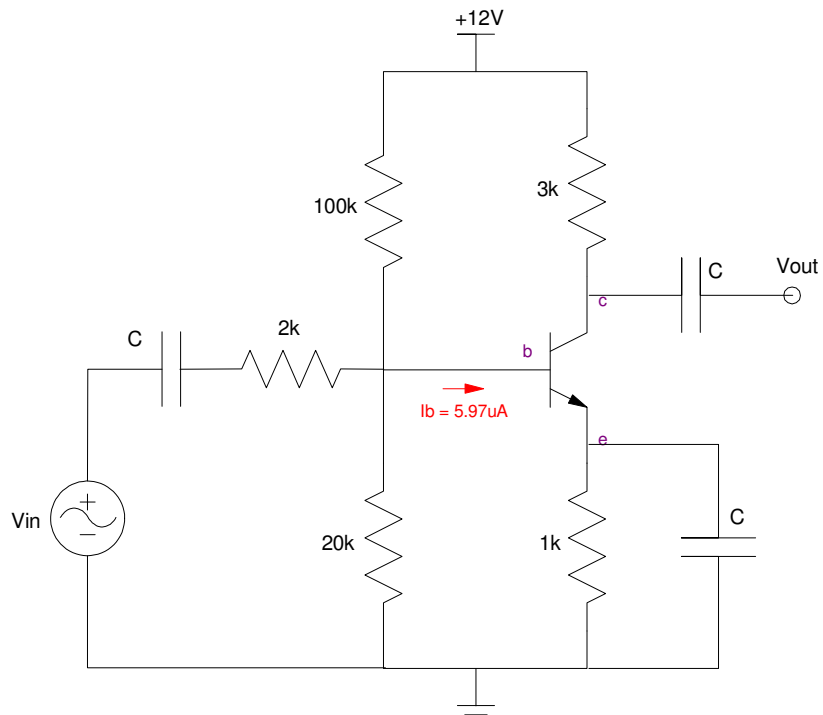
1) Draw the small signal model for the following CE amplifier. Assume

$$r_f = \left(\frac{0.026}{I_b} \right) = 4355\Omega$$

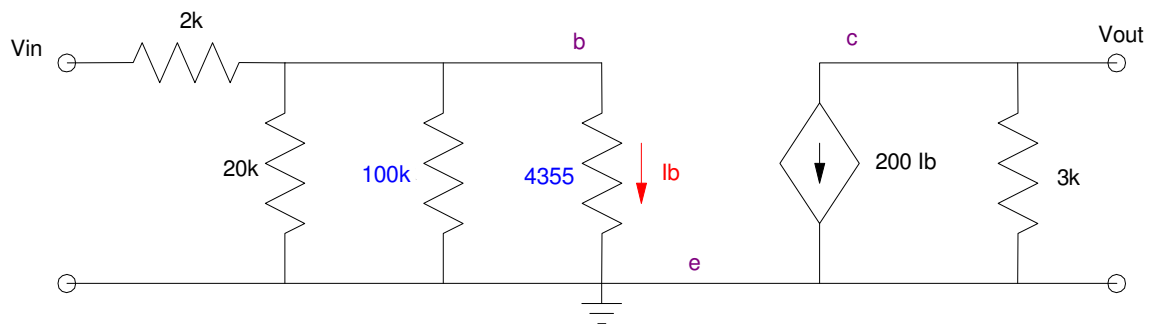
2) Determine the 2-port model for this amplifier



Solution:



Draw the small signal model (AC model)



Determine the 2-port parameters

- $A_i = 0$ (by inspection)
- $R_i = 2k + 20k \parallel 100k \parallel 4355 = 5453$
- $R_{out} = 3000$ (by inspection)
- A_o : This one you have to work for

Ao: Let $V_{in} = 1V$. I_b is then

$$V_b = \left(\frac{20k \parallel 100k \parallel 4355}{20k \parallel 100k \parallel 4355 + 2000} \right) 1V = 0.6332V$$

$$I_b = \frac{0.6332V}{4355\Omega} = 145.4\mu A$$

$$200I_b = 29.08mA$$

$$V_{out} = -3000 \cdot 200I_b = -87.24V$$

The net result is then

