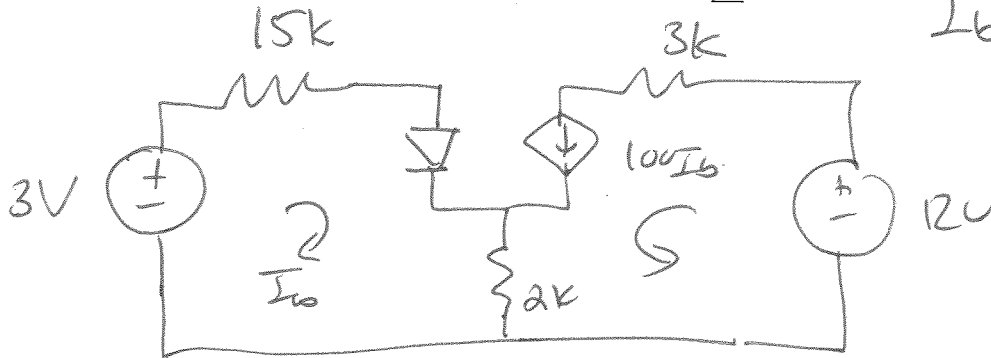
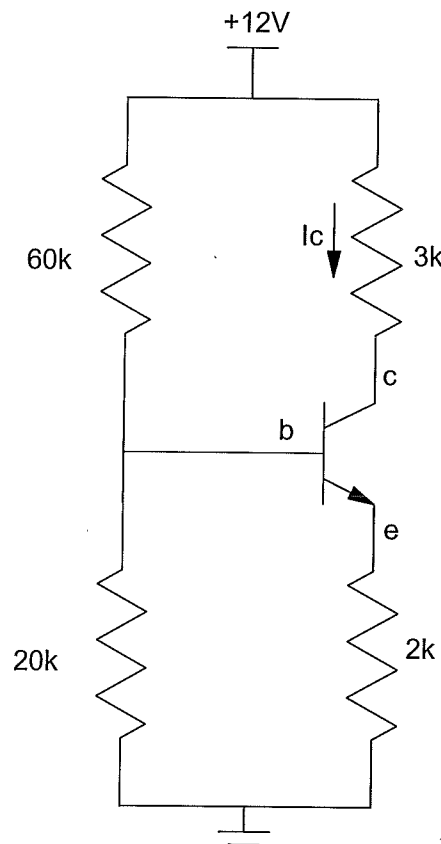


ECE 323 - Quiz 3: Name _____

BJT Amplifiers - December 3, 2015

1) Determine the Q-point for the following BJT amplifier. Assume $\beta = 100$

Vb	Vc	Ve	Ic
6.77V 2.84V	8.82V	6.07V 2.142V	1.06 μ A



$$I_b = \frac{3 - 0.7}{15k + (100)2k} = 10.6 \mu A$$

$$I_c = 1.06 \mu A$$

2) Design a BJT circuit to bias the Q-point so that

- $V_{ce} = 6V$, and
- The Q-point is stabilized for variations in β $\{(1 + \beta)R_e \gg R_{bb}\}$. Assume $\beta = 100$

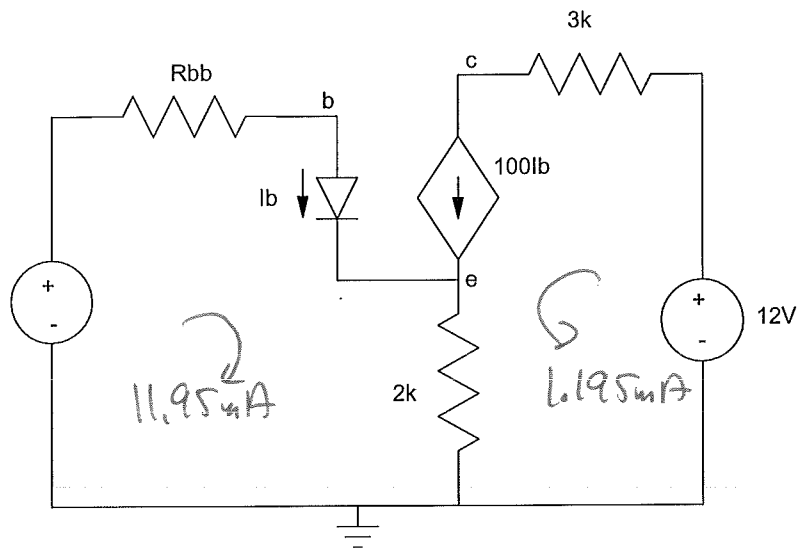
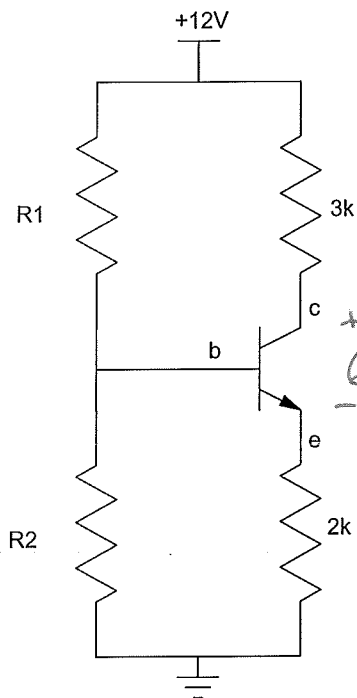
R1	R2	V _{bb}	R _{bb}
71.57k	27.76k	3.353V	20k

37.11k

13.69k

3.234V

10k



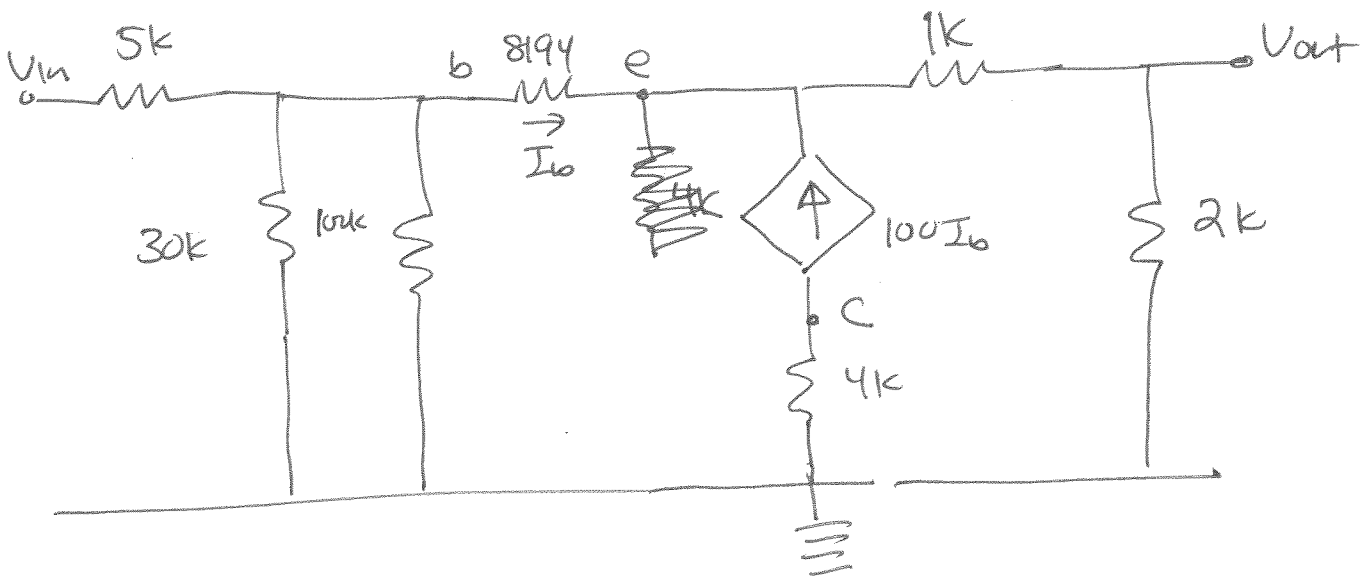
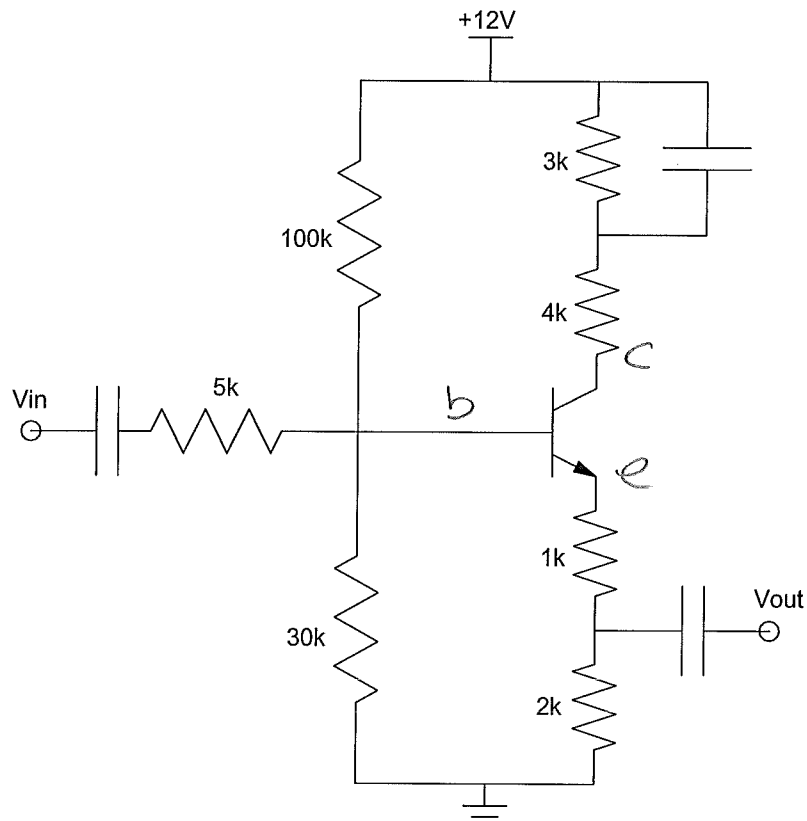
$$(20 \times 2k) \gg R_{bb}$$

$$R_{bb} = 20k$$

3.139

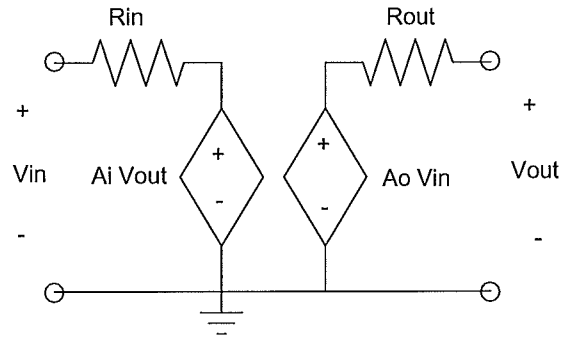
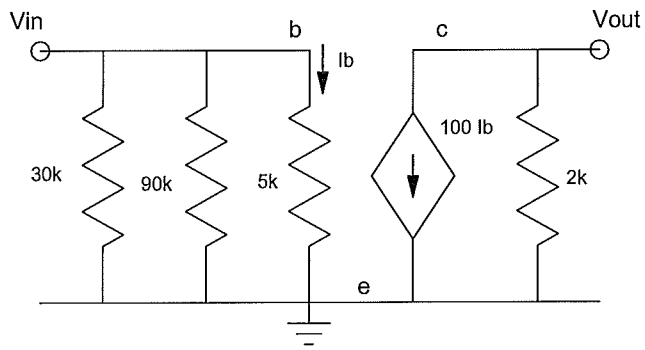
3) Draw the small-signal model (AC circuit) for the following circuit. Assume

- $\beta = 100$
- $r_f = 8194\Omega$ ($I_b = 6.35\mu A$)



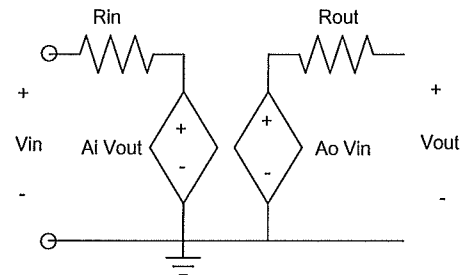
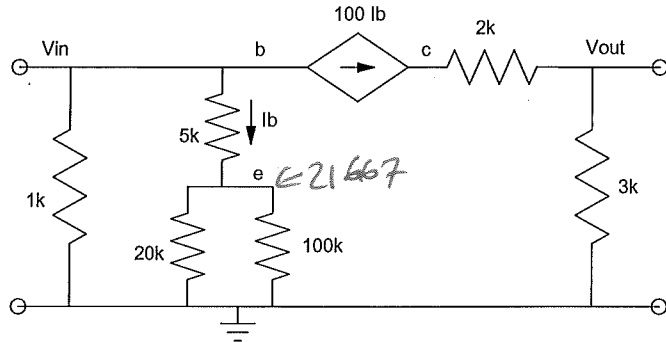
4) Find the 2-port model for the following circuit

R_{in}	A_i	R_{out}	V_o / V_o
4091	0	2000	-40



5) Find the 2-port model for the following circuit

R_{in}	A_i	R_{out}	V_o/A_o
237 176.63	○	3k	13.84



$$R_{in} = 1000 \parallel 21667 \parallel \frac{21667}{100}$$

$$A_o = \frac{(100)(3000)}{21667}$$

Colbert Trivia Bonus! What priceless artifact can be seen on the set of the Colbert Show?

- Edward Snowden's keyboard
- A statue from Babalonia, given by a fan who fought in Iraq
- Frodo Baggins's sword, Sting, from the Lord of the Ring's movie set
- Thor's hammer from the 1st Avenger's movie
- Captain America's shield