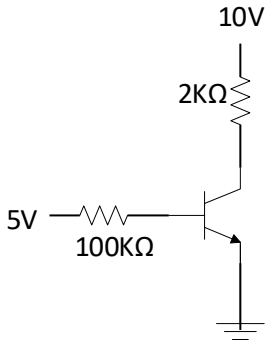
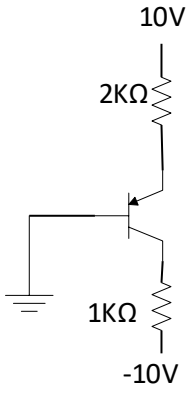
Electronic Devices

Sheet #6

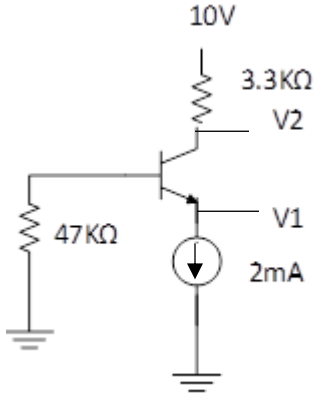
1- For the circuits shown, draw the equivalent AC circuit model. Denote on your schematic the values of rπ and ro . (β = 100, VA = 100 V)



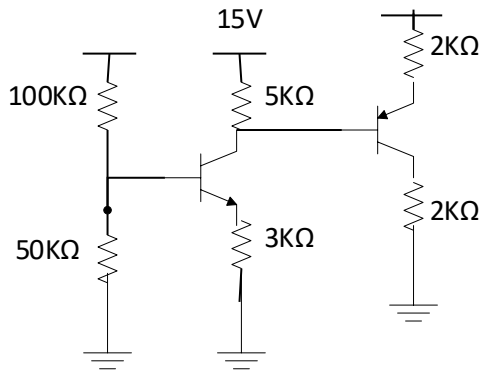
2- For the circuits shown, draw the equivalent AC circuit model. Denote on your schematic the values of rπ and ro . (β = 100, VA = 100 V)



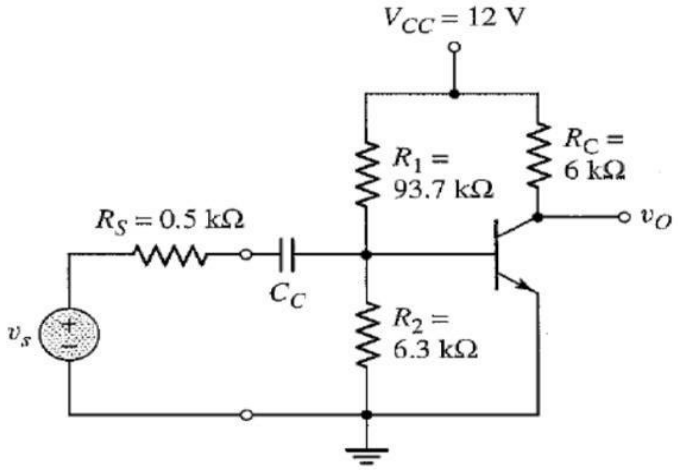
3- For the circuits shown, draw the equivalent AC circuit model. Denote on your schematic the values of rπ and ro . (β = 100, VA = 100 V)



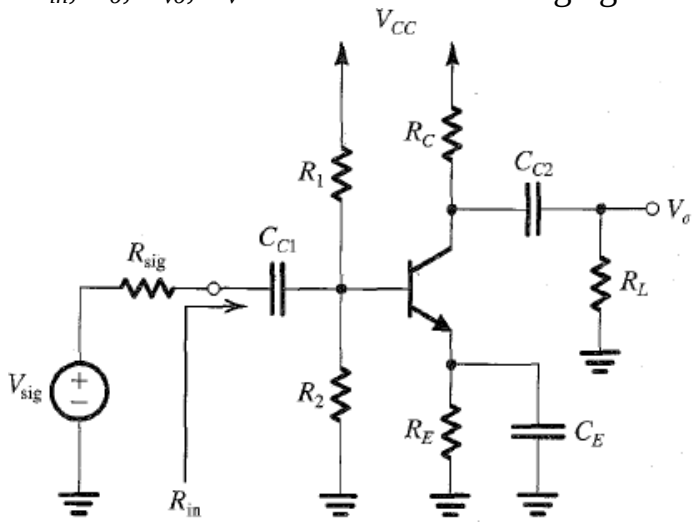
4- For the circuits shown, draw the equivalent AC circuit model. Denote on your schematic the values of rπ and ro. (β = 100, VA = 100 V)



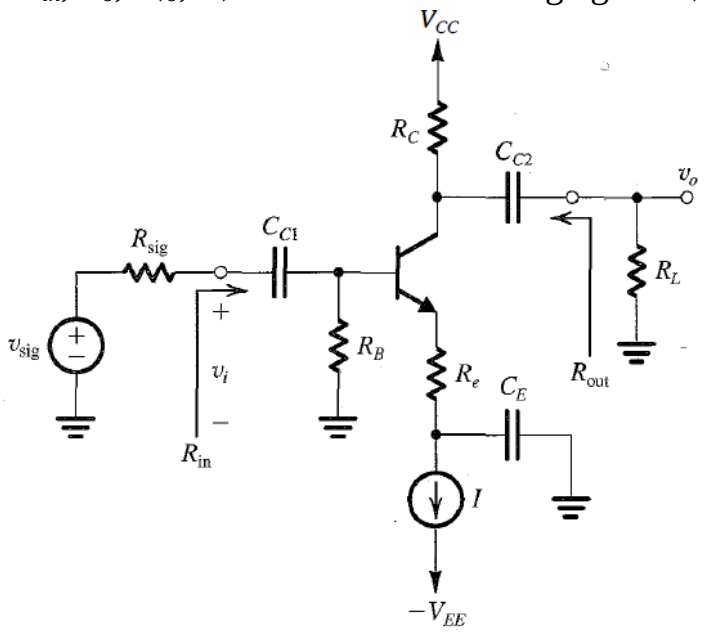
5- Determine the small-signal voltage gain, input resistance, and output resistance of the circuit shown. Assume the transistor parameters are: β=100, VBE(on) =0.7V, and VA=100V



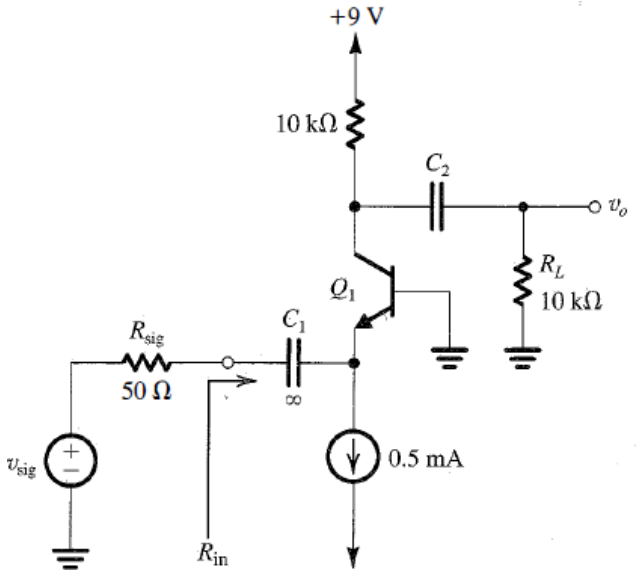
6- For the common-emitter amplifier shown, let V_{CC} = 15 V, R_1 = 27kΩ, R_2 = 15 kΩ, R_E = 2.4 kΩ, and R_C = 3.9 kΩ. The transistor has β = 100. Calculatethe dc bias current I_C. If the amplifier operates between a source for which R_{sig} = 2 kΩ and a load of 2 kΩ, replace the transistor with its hybrid-π model, and find the values of R_{in}, R_o, A_{vo}, A_v and the overall voltage gain G_v (v_o/ v_{sig}).



7- For the common-emitter amplifier with an Emitter resistance shown. Find the equations of R_{in}, R_o, A_{vo}, A_v and the overall voltage gain G_v (v_o/ v_{sig}).



8- For the circuit shown, draw a complete small-signal equivalent circuit (use α= 0.99). Your circuit should show the values of all components, including the model parameters. What is theinput resistance R_{in}? Calculate the voltage gain (v_o/ v_{sig}).



9- The amplifier consists of two identical common-emitter amplifiers connected in cascade. Observe that the input resistance of the second stage, R_{in2}, constitutes the load resistance of the first stage.

(a) For V_{CC} = 9 V, R_1 = 100 kΩ, R_2 = 47 kΩ, R_E = 3.9 kΩ, R_C = 6.8 kΩ, and β = 100, determine the dc collector current and dc collector voltage of each transistor.

(b) Draw the small-signal equivalent circuit of the entire amplifier and give the values of all its components.