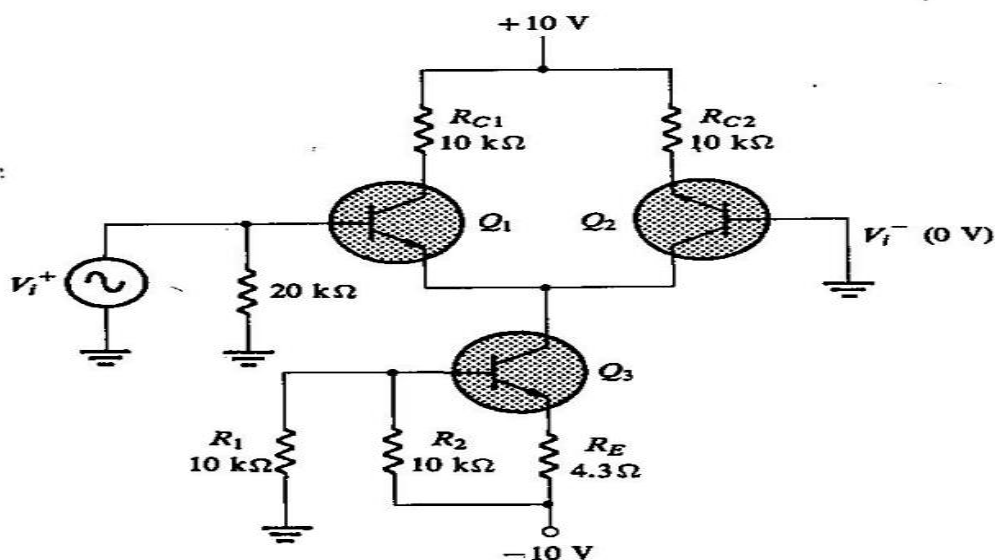




ECE 347 – Electronics II + Lab

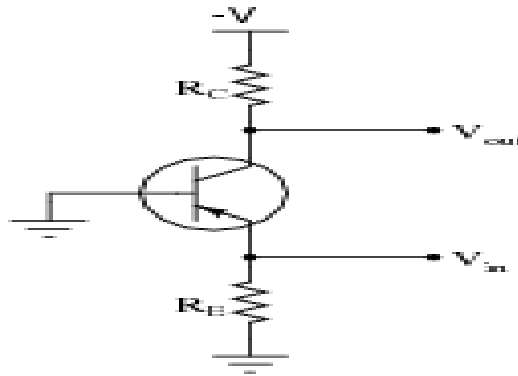
\_ LAB 6 / Laboratory Homework 1\_

Question 1)



- A) For the above circuit, Calculate DC Bias voltages and currents for each transistors.
- B) Construct the above circuit in PROTEUS program. Set both supplies,  $V_{CC} = 10 \text{ Volt}$  and  $V_{EE} = -10 \text{ Volt}$ . Measure and write DC Bias voltages for each transistors. Using measured values, determine  $I_E$  and  $r_e$  for each transistors.
- C) Calculate the differential and common – mode gain ( $A_{V_d}$  and  $A_{V_c}$  )
- D) Apply input of  $V_i = 20 \text{ mV}$ ,  $f = 10 \text{ KHz}$  to the plus (+) input and  $0\text{V}$  to the minus (-) input in the circuit of the above figure. Measure in PROTEUS program and write the output voltages ( $V_{O_1}$  and  $V_{O_2}$ ) and calculate an average value of  $V_{O_d}$ .  
 ( HINT: The formula of  $V_{O_d} = \frac{V_{O_1} + V_{O_2}}{2}$  )  
 ( HINT: Electronic Elements to be used in PROTEUS program = (2N3703 PNP Bipolar Transistor), 2x (2N2369 NPN Transistors) , frequency= 1 KHz,  $V_{Amplitude} = 10 \text{ mV}$ )

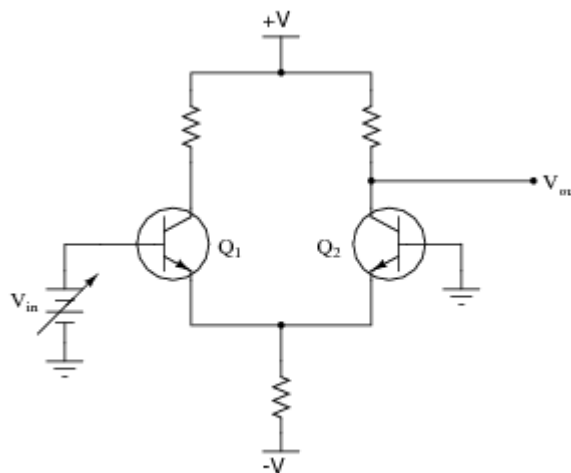
**Question 2)** Identify the type of transistor amplifier this is (common-collector, common-emitter, or common-base), and identify whether it is “inverting or non-inverting.”



Also, explain how to derive the voltage gain equation for this amplifier:

$$A_V = \frac{R_C}{r_e}$$

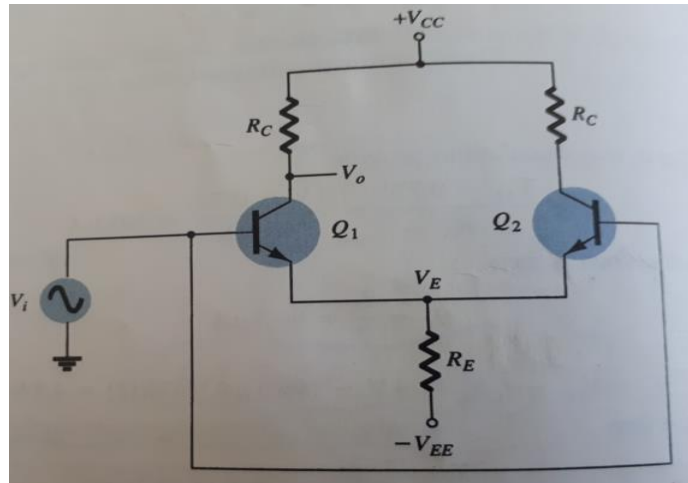
**Question 3)** Would you characterize this following transistor amplifier as being “inverting” or “noninverting”, with the base terminal of transistor Q1 being considered the input? Explain your answer.



**Question 4)**

- A) For the following circuit, Calculate DC Bias voltages and currents for each transistors.
- B) Construct the following circuit in PROTEUS program. Set both supplies,  $V_{CC}=10$  Volt and  $V_{EE}=-9$  Volt. Measure and write DC Bias voltages for each transistors. Using measured values, determine  $I_E$  and  $r_e$  for each transistors.
- C) Calculate the differential and common – mode gain ( $A_{V_d}$  and  $A_{V_c}$  )

**D)** Apply input of  $V_i = 20\text{ mV}$ ,  $f = 10\text{ KHz}$  to the plus (+) input and  $0\text{V}$  to the minus (-) input in the circuit of the following figure. Measure in PROTEUS program and write the output voltage  $V_o$ ,  $V_E$ , and  $V_C$  for each transistors.



( **HINT:** Electronic Elements to be used in PROTEUS program = 2x (2N2369 NPN Transistors), frequency= 1 KHz,  $V_{Amplitude} = 10\text{ mV}$ ,  $R_C = 10\text{ kiloohm}$ ,  $R_E = 5.6\text{ kiloohm}$  )