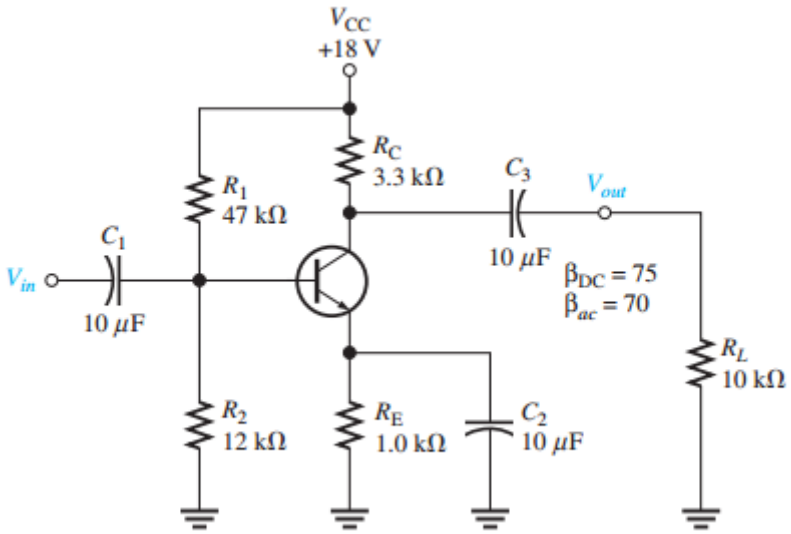
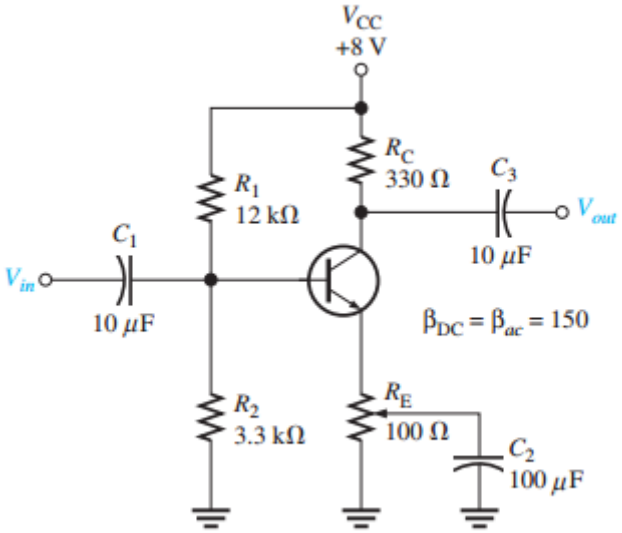
Q1) a- Determine the following ac values for the amplifier in Figure below
1) R_{in}(base) 2) R_{in} 3) R_{out} 4) A_v 5) A_i 6)A_p

b- Assume that a 600Ω, 12μ Vrms voltage source is driving the amplifier in Figure below, Determine the overall voltage gain by taking into account the attenuation in the base circuit and find the total output voltage (ac and dc). What is the phase relationship of the collector signal voltage to the base signal voltage?

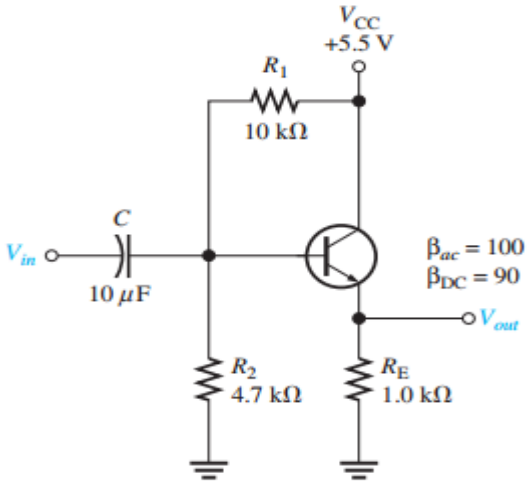


Q2) The amplifier in Figure below has a variable gain control, using a 100Ω potentiometer for R_E Determine the maximum and minimum gains for this unloaded amplifier. What is the gain when the potentiometer adjusted to the midpoint?

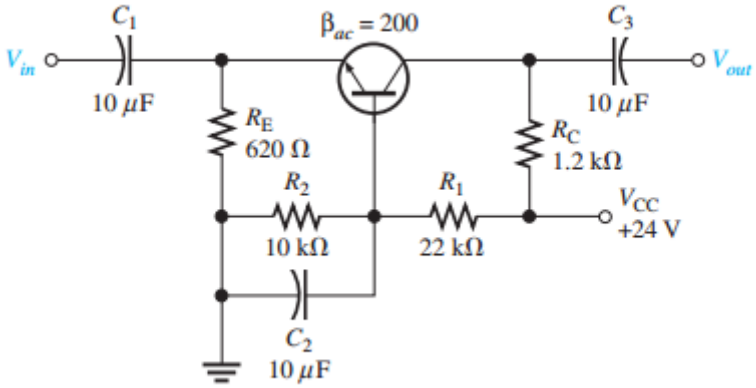


Q3) Determine for the unloaded emitter-follower in Figure below

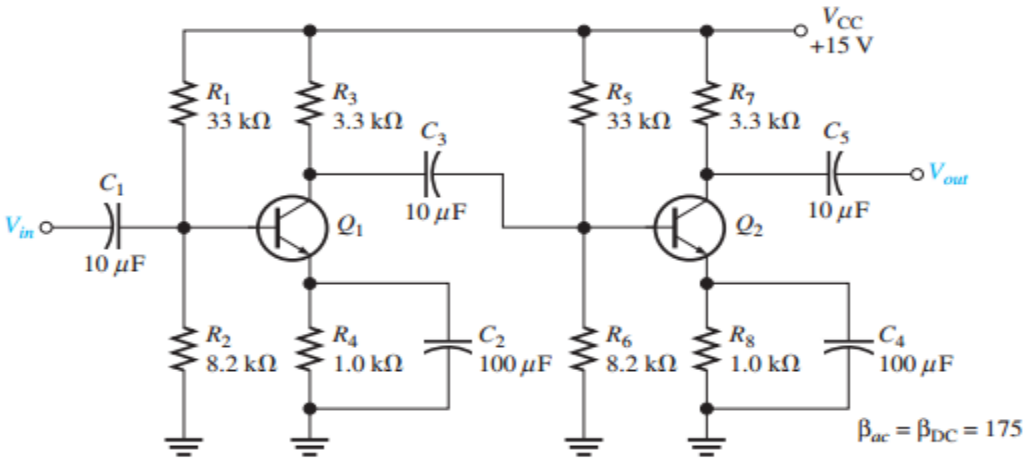
1) R_{in}(base) 2) R_{in} 3) R_{out} 4) exact A_v 5) A_i 6)A_p



Q4) Find R_{in}, A_v, A_i and A_p for the unloaded amplifier in Figure below



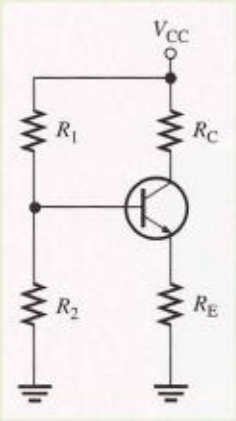
Q5) If the multistage amplifier in Figure below is driven by a 75 Ω,50μ Vrms source and the second stage is loaded with an R_L =18kΩ determine voltage gain of each stage and overall voltage gain



SUMMARY OF THE BJT TRANSISTOR AMPLIFIER and Biasing CIRCUITS

	CE	CC	CB
Voltage gain, A_v	High R_C/r'_e	Low $\cong 1$	High R_C/r'_e
Current gain, $A_{i(max)}$	High β_{ac}	High β_{ac}	Low $\cong 1$
Power gain, A_p	Very high $A_i A_v$	High $\cong A_i$	High $\cong A_v$
Input resistance, $R_{in(max)}$	Low $\beta_{ac} r'_e$	High $\beta_{ac} R_E$	Very low r'_e
Output resistance, R_{out}	High R_C	Very low $(R_s/\beta_{ac}) \parallel R_E$	High R_C

VOLTAGE-DIVIDER BIAS



- Q-point values ($I_C \cong I_E$)
- Collector current:

$$I_C \cong \frac{V_{TH} - V_{BE}}{R_E + R_{TH}/\beta_{DC}}$$

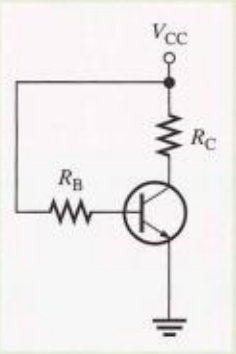
where $R_{TH} = \dfrac{R_2}{R_1 + R_2}$

and $V_{TH} = R_{TH} V_{CC}$

- Collector-to-emitter voltage:

$$V_{CE} \cong V_{CC} - I_C(R_C + R_E)$$

BASE BIAS



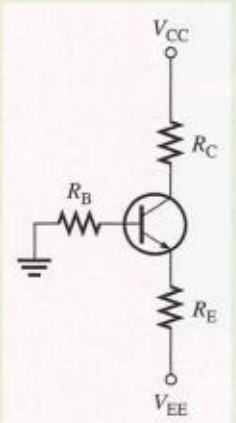
- Q-point values ($I_C \cong I_E$)
- Collector current:

$$I_C = \beta_{DC}\left(\frac{V_{CC} - V_{BE}}{R_B}\right)$$

- Collector-to-emitter voltage:

$$V_{CE} = V_{CC} - I_C R_C$$

EMITTER BIAS



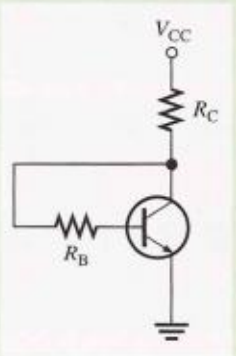
- Q-point values ($I_C \cong I_E$)
- Collector current:

$$I_C \cong \frac{V_{EE} - V_{BE}}{R_E + R_B/\beta_{DC}}$$

- Collector-to-emitter voltage:

$$V_{CE} \cong V_{CC} + V_{EE} - I_C(R_C + R_E)$$

COLLECTOR-FEEDBACK BIAS



- Q-point values ($I_C \cong I_E$)
- Collector current:

$$I_C = \frac{V_{CC} - V_{BE}}{R_C + R_B/\beta_{DC}}$$

- Collector-to-emitter voltage:

$$V_{CE} = V_{CC} - I_C R_C$$