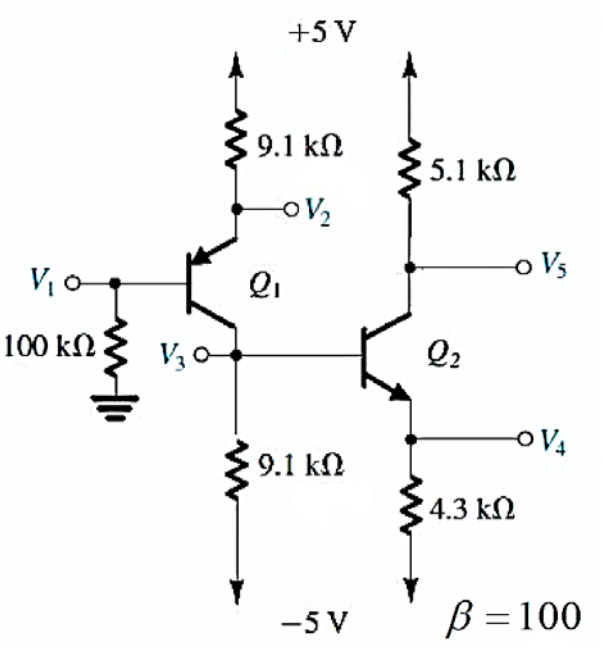
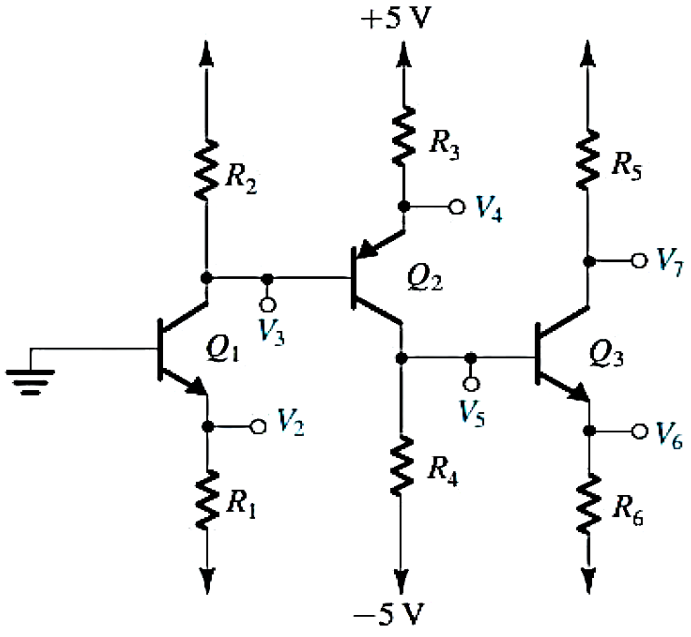
EE210: HW-6 and HW-7

Date: 11.02.2019

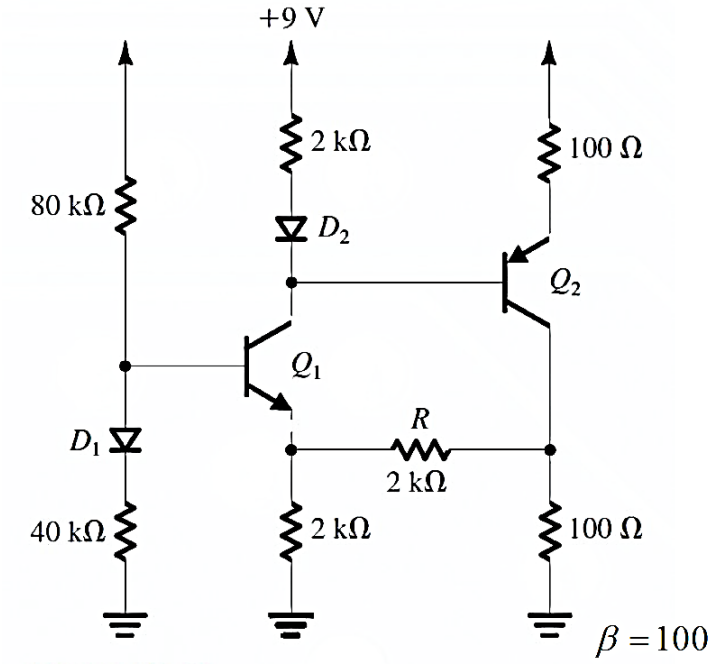
Q.1 Carry out dc analysis for the figure shown below to determine voltages and currents.



Q.2 Using $\beta = \infty$, design the circuit shown in Fig below so that the bias currents in Q_1, Q_2 and Q_3 are 1mA, 1mA and 2mA, respectively and $V_3 = 0, V_5 = -2V$ and $V_7 = 1V$.

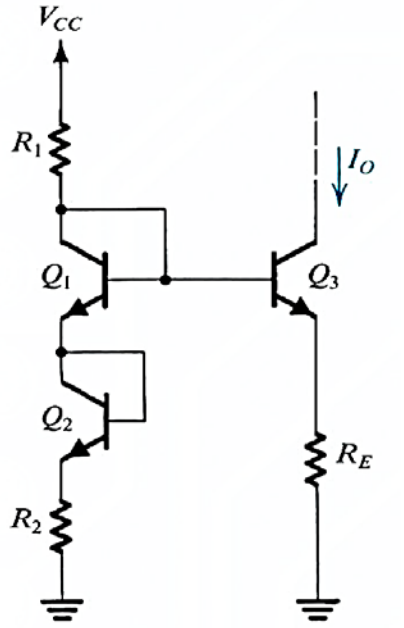


Q3. Carry out dc analysis of the circuit shown below.



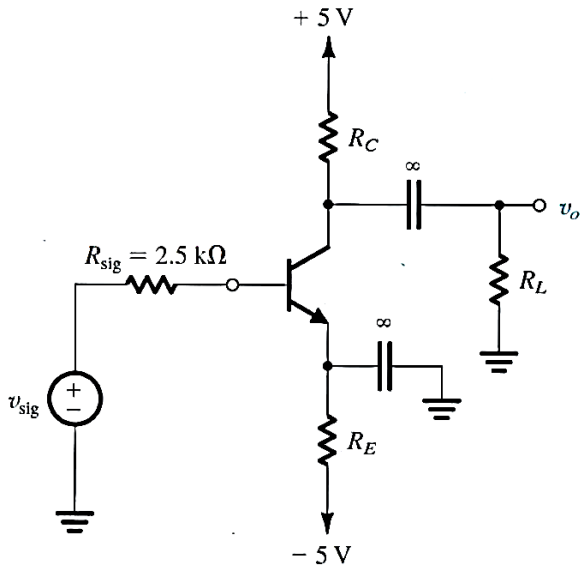
Q.4 Show that for $R_1 = R_2 = R$,

$$I_0 = \frac{V_{cc}}{2R_E}$$

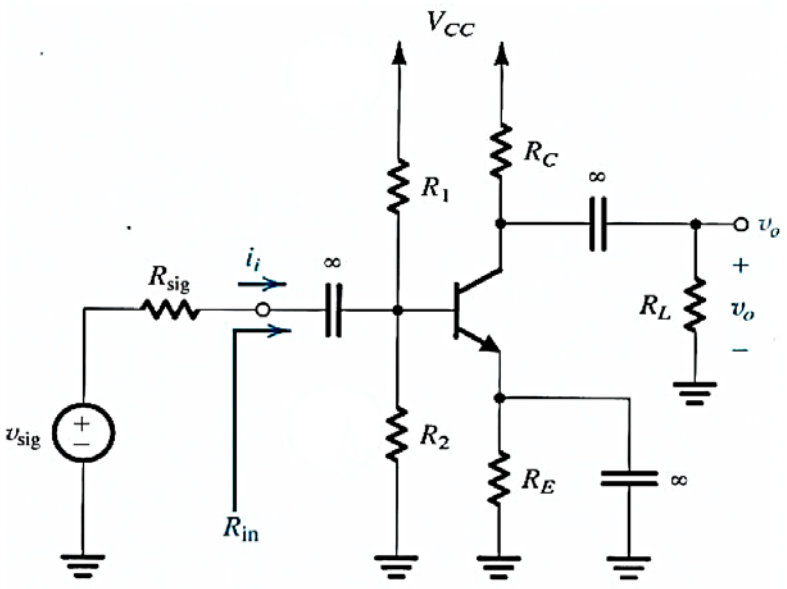


Q.5 In the circuit shown below, v_{sig} is a small sine-wave signal with zero average. The transistor β is 100.

(a) Find the value of R_E to establish a dc emitter current of about 0.5mA.
(b) Find R_C to establish a dc collector voltage of about +1V.
(c) For R_L=10KΩ draw the small-signal equivalent circuit of the amplifier and determine its overall voltage gain.



Q.6 For the common-emitter amplifier shown in Fig below let V_{cc}=15V, R_1=27KΩ, R_2=15KΩ, R_E=2.4KΩ and R_C=3.9KΩ. The transistor has β =100. Calculate the dc bias currentI_C. If the amplifier operates between a source for which R_{sig}=2KΩ and a load of 2KΩ, replace the transistor with its hybrid-π model, and find the values of R_{in} and the overall voltage gain v_0/v_{sig}.



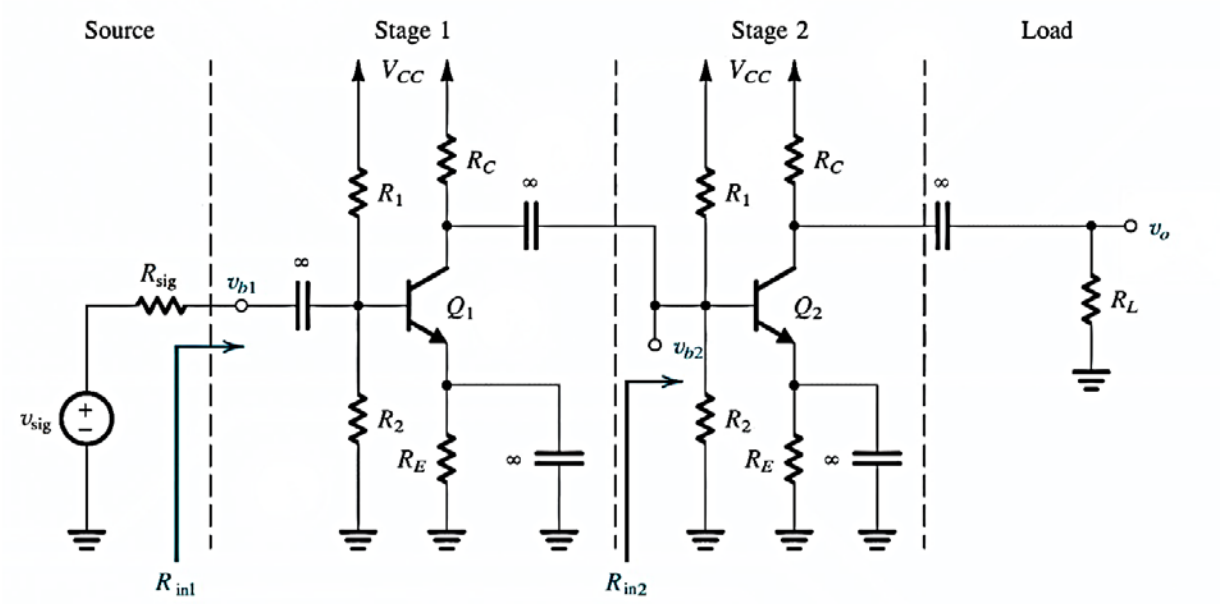
Q.7 The amplifier of Fig below consists of two identical common-emitter amplifiers connected in cascade. Observe that the input resistance of the second stage. R_{in2}, constitutes the load resistance of the first stage.

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

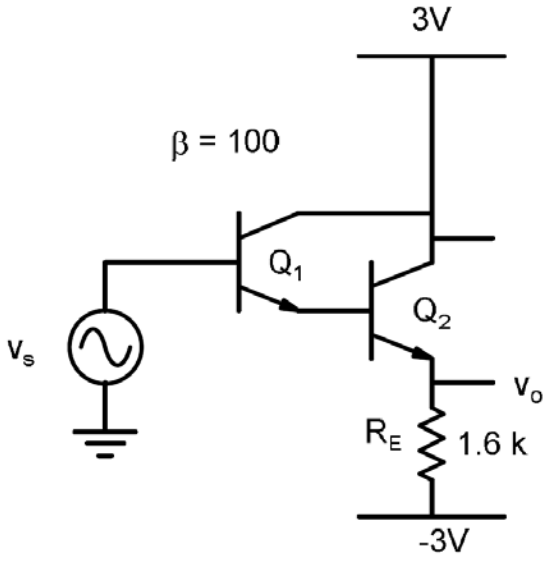
(b) Draw the small signal equivalent circuit of the entire amplifier and give the values of all its components.

(c) Find R_{in1} and v_{b1}/v_{sig} for R_{sig}=5KΩ

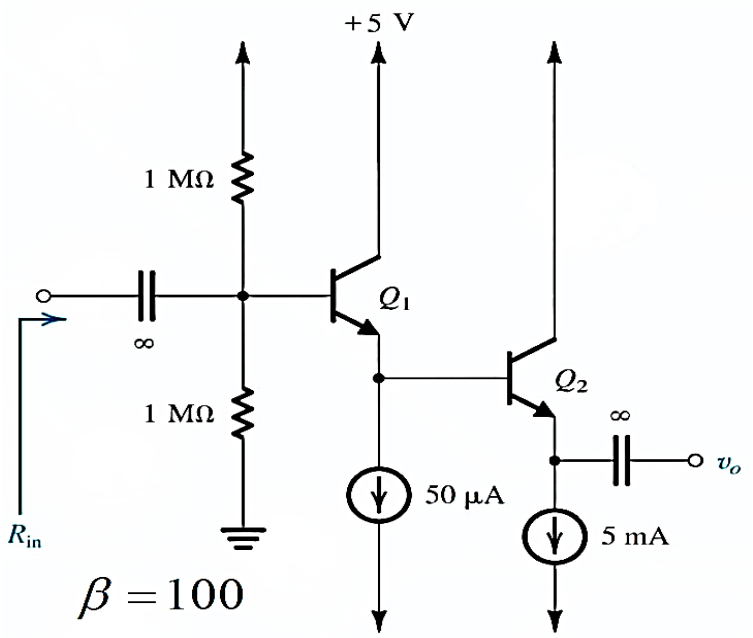
(d) Find R_{in2} and v_{b2}/v_{b1}.



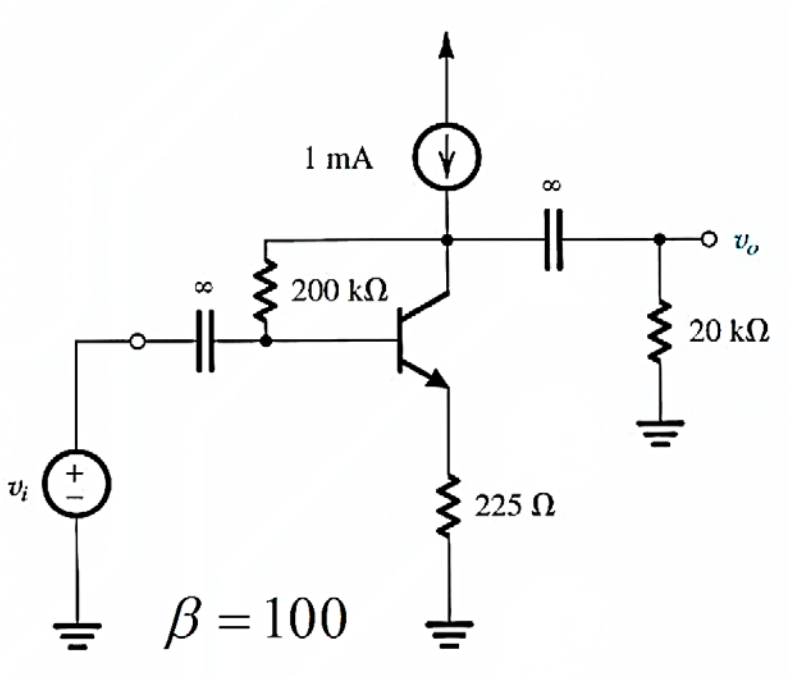
Q.8 Analyze the circuit shown below to determine voltage gain and output resistance.



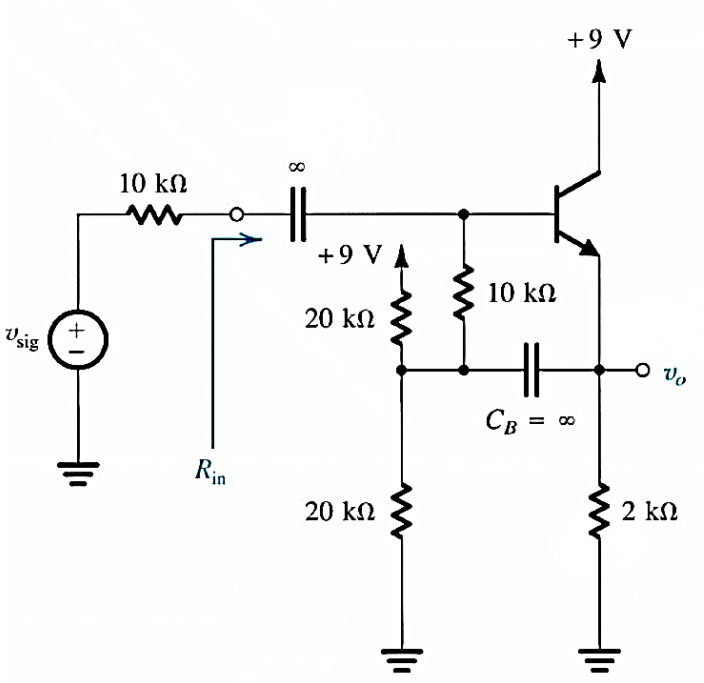
Q.9 Determine input resistance for the circuit shown below.



Q.10 Determine voltage gain of the amplifier by replacing the Transistor by its hybrid-pi model and analyzing the resulting small signal equivalent circuit.



Q.11 Determine the input resistance of the amplifier by replacing the transistor by its hybrid-pi model and analyzing the resulting small signal equivalent circuit.



Q.12 Determine voltage gain of the amplifier shown below.