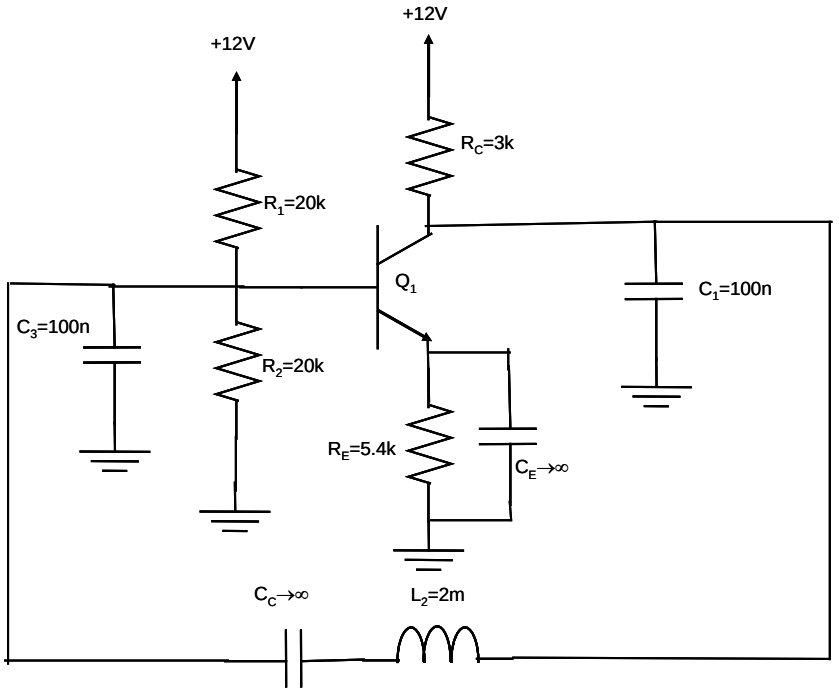
Exercise:

The figure represents the circuit of a sinusoidal oscillator:



Q_1 Data:

V_{BEact}=0.6V
V_{CEsat}=0.2V
β=160
V_T=25mV
$r_o \to \infty$
$C_\mu = 0$
$C_\pi = 0$

a) Indicate what type of oscillator it is and identify the networks A* and β*.
b) Obtain the operating point in DC of Q_1.
c) Obtain the generic equivalent circuit (input resistance, voltage gain and output resistance) in small signal at medium frequencies of network A *. (If you have not resolved the previous section, consider I_{CQ1} = 1mA).
d) Obtain the expression of the loop gain (A*·β* (jω)) of the oscillator, justifying the approximations made in the calculations.
e) Deduce the value of the oscillation angular frequency (ω_{osc}) of the circuit.
f) Would the oscillator start with the values of the components given in figure 3? Justify your answer.