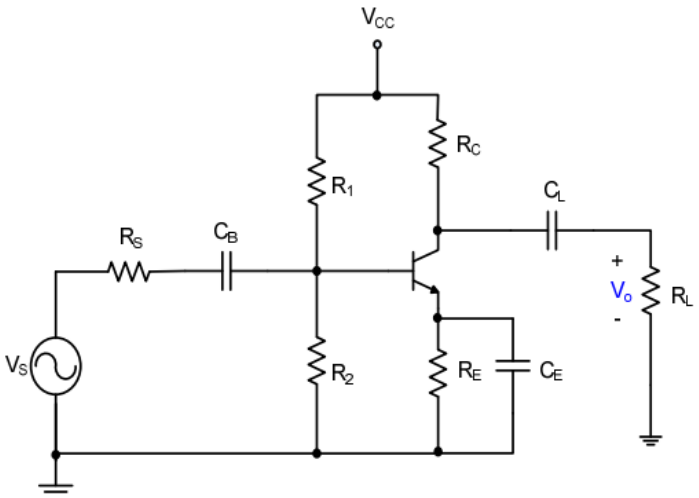
Open Ended Lab: Frequency Response of Transistor Amplifier Circuits

The objective of this study is to simulate, observe and evaluate the characteristics and performance of the single stage and multi- stage BJT amplifier circuits. Read the instructions carefully:

Consider the following Common Emitter (CE) circuit with parameters: Rs= 1kohm, R_1=20kohm, R_2=10kohm, Rc=3.3kohm. R_L=10kohm, $C_B = C_L$ = 10uF, C_E=47uF and supply voltage, Vcc=15V.



Construct the circuit. Plot the voltage gain vs frequency with R_E=2.2Kohms. If you change the value of R_E, will it affect the frequency response? If you keep R_E constant and vary CE from 10uF to 100uF, how will it affect the frequency response? Besides, do you think variation in load resistance and source resistances can affect the frequency response? (Determine the bandwidth, cut-off frequencies and unity gain frequency from your analysis)

Now, Cascade a Common Collector Amplifier (CC1) followed by the previously mentioned CE Amplifier. Plot the voltage gain vs frequency of this two- stage amplifier. Study the effect of variation in load resistance on the frequency response of this circuit. Do you think it improves the circuit performance? Also, study the effect of variation in source resistance on frequency response of the circuit. (Determine the bandwidth, cut-off frequencies)

Now, cascade the previously mentioned two-stage amplifier followed by a Common- Collector (CC2) Amplifier. Plot the voltage gain vs frequency of this three- stage amplifier. Study the effect of variation in load resistance on the frequency response of this circuit. Do you think it improves the circuit performance? Also, study the effect of variation in source resistance on frequency response of the circuit. (Determine the bandwidth, cut-off frequencies)

Write a discussion on how frequency, load and source resistances limit circuit performance and how different circuit parameters and addition of CC stages minimize those effects and improves the overall gain and the frequency response. Conclude the discussion mentioning what can be inferred from the study, specifically about amplifier's performance, what limits the performance and how to overcome those limitations