Experiment 3: Design and analysis of Current Series Feedback amplifier

AIM: To obtain the frequency response characteristics of a Current Series amplifier with and without feedback and Obtain the bandwidth.

Theory: The current feedback can be obtained by removing the bypass capacitor across the emitter resistor R_E, as shown in Figure in case of CE amplifier. The emitter resistance R_E provides the negative current feedback. The current Ie flowing through resistor R_E produces a voltage drop $I_E R_E$ across emitter resistance R_E. This voltage is fed back to the input and opposes the input signal as it is in opposition. This negative voltage feedback is proportional to collector current because $I_E \approx I_C$. Thus negative Current Series Feedback Amplifier is provided.

Circuit Diagram:

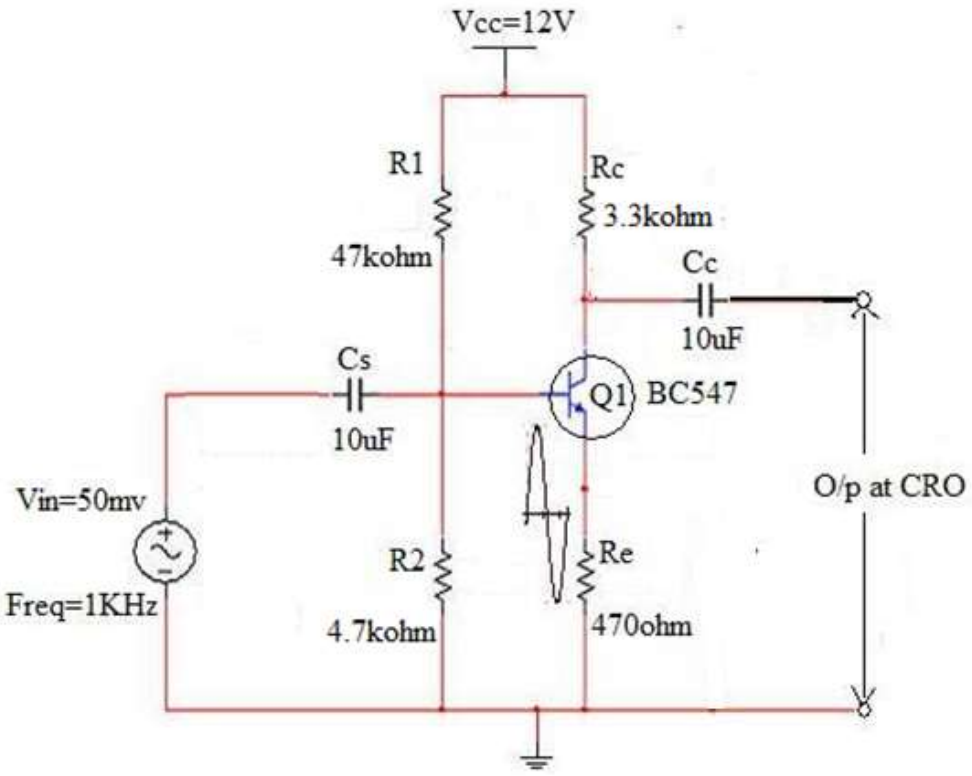

Fig 1:Current Series Feedback Amplifier with Feedback

Pre-lab Session

1) Explain the role of the emitter bypass capacitor Ce in a CE amplifier. Why is it important for signal amplification?

2) What is the function of the coupling capacitor CS , and under what condition can it be omitted from the CE amplifier circuit?

3) Why do we assume coupling and bypass capacitors to act as perfect short circuits at signal frequencies? What practical limitation arises at low frequencies?

In-Lab Session

Procedure:

1. Connect circuit as per circuit diagram.

2. Set the Input = 50 mv (sine wave), using the Function generator and then connect at the input terminals.

3. Connect the C.R.O at output terminals i.e Output (Vo).

4. Keep the input voltage constant, Vary the frequency from 50 Hz to 1 MHz in regular steps and

   note down the corresponding output voltage.

5. Calculate the gain & magnitude of the amplifier using the given formula.

   Max volage Gain = V_o/V_i

   Gain in dB= 20 log (V_o / V_i)

6. Plot the graph on semi-log sheet taking frequency(Hz) along X-axis and gain in (dB)along y-axis. Frequency response graph is as shown in fig. Below
7. Indicate the lower 3dB frequency ($f_{L)}$ and upper3dB the bandwidth (f_H) the graph.
8. Calculate the bandwidth from the graph, BW= f_H-f_L(Hz)
9. Compare the frequency response plot thus obtained with that of the CE Amplifier.

Model Graph:

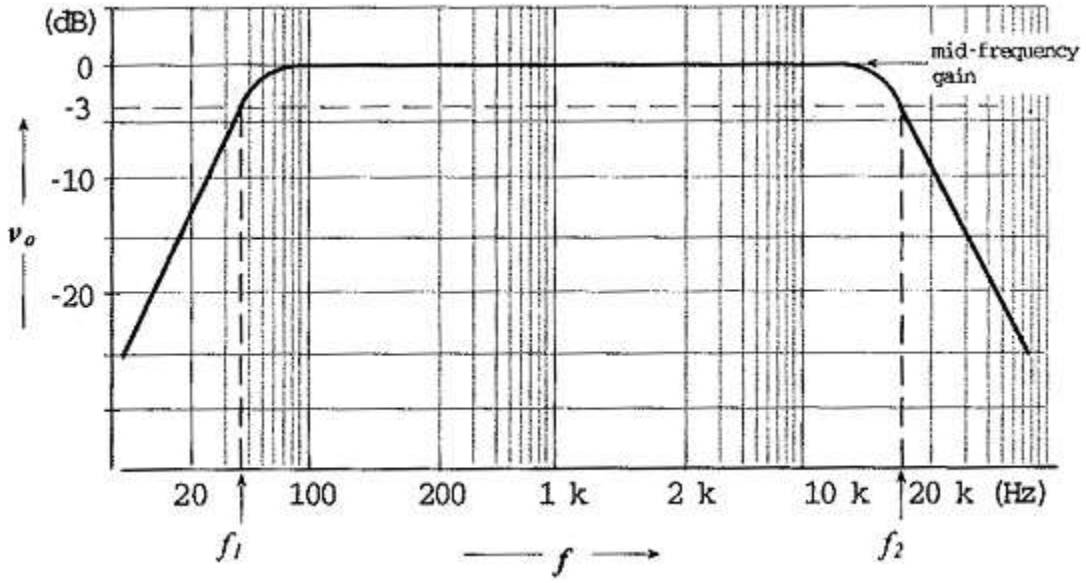

Fig: Frequency response of Current Series feedback amplifier

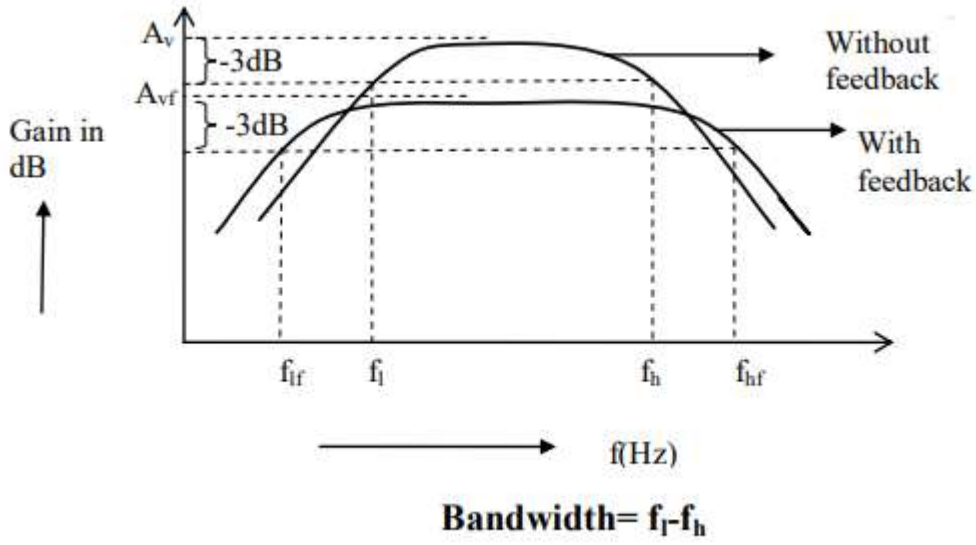

Fig: Comparison of frequency response of CE Amplifier and Current Series feedback amplifier

Tabular column:

Vi=50mv

Sl No.	Frequency	V_O (volts)	Gain = V_O/V_i	Gain (dB) =20log V_O/V_i

Calculations:

1) Maximum voltage gain =

2) Lower cut-off frequency (f_L) =

3) Upper cut-off frequency (f_H) =

4) Band width (f_H- $f_{L)}$ =

Inference and Analysis:

Result:

Evaluator Remark (if Any):	**Marks Secured: _____out of 50**
	Signature of the Evaluator with Date