IC161P-Applied Electronics Lab

Lab Exercise-3. Design of Common Emitter Amplifier

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1.Abstract

To understand the functioning of Common Emitter Amplifier

2.Apparatus Required

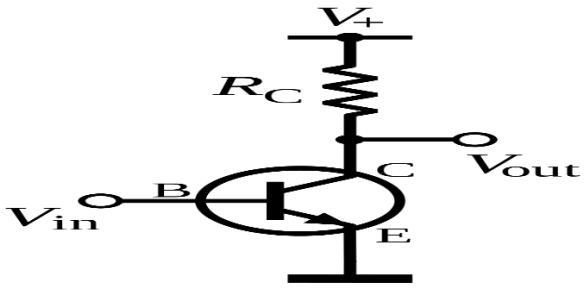
S.N.	Devices
1	2N222 Transistor
2	Resistor
3	Voltage Sources
4	Capacitor
5	Connecting Wires

3.Theory

Amplifier is an electronic device which increases the strength of voltage in a circuit.

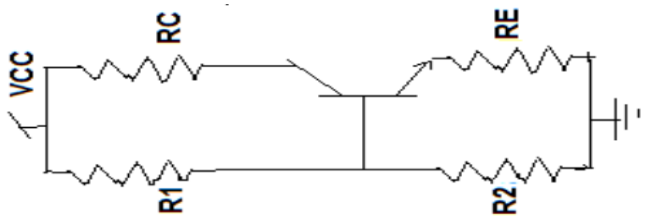
Common Emitter Amplifier is a type of voltage amplifier which has three BJT(Bipolar Junction Transistor).

Basic NPN common-emitter circuit

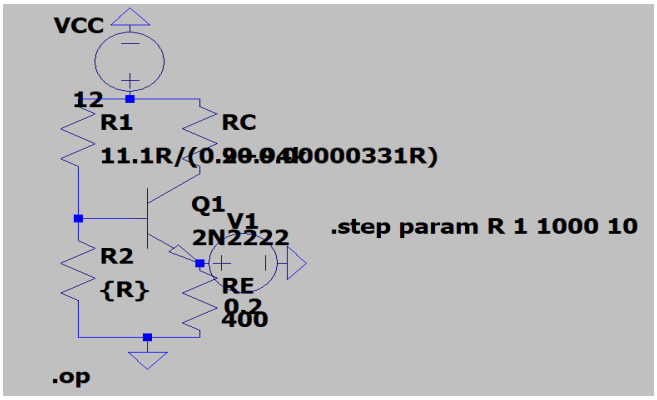


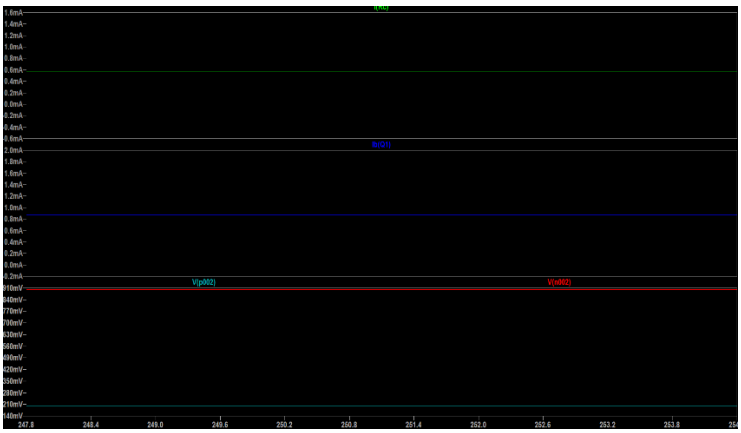
4.Circuit diagram and analysis

1. Design a common emitter BJT amplifier as shown in figure 1 with g mS m = 19.2 and RE = 400Ω . Assume that VRE = 200mV and I S A 15 6.734 10 − = × . Let the amplifier is designed to have a β = 150 . Assume VCC = 12V .

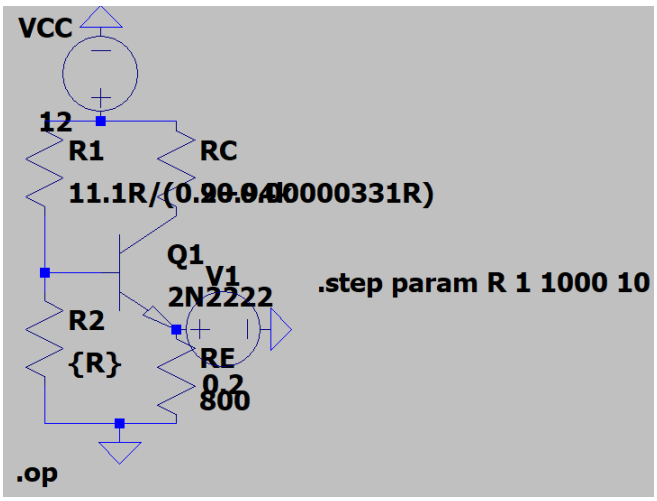


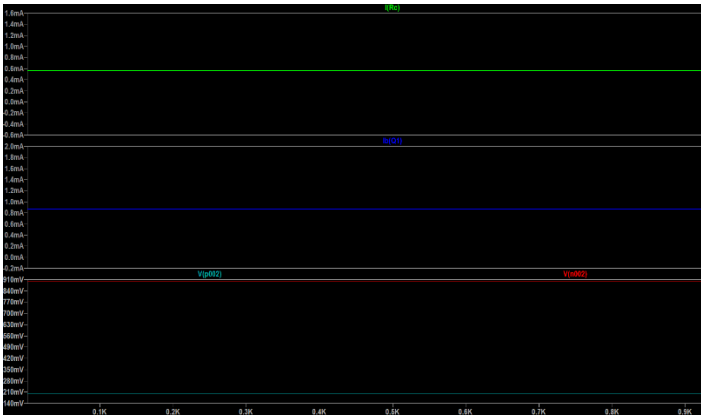
A. Estimate the sensitivity of C I , B I and VBE to variation in R2 .





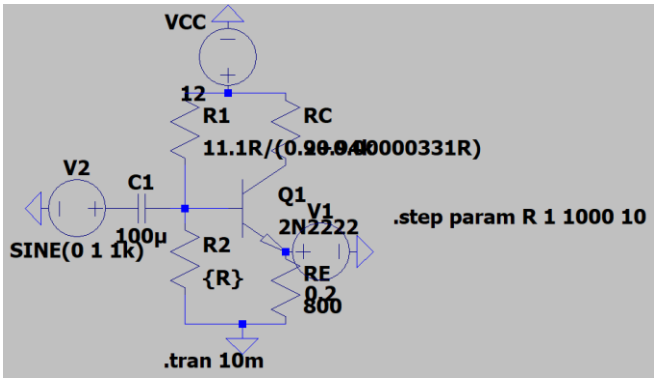
B. Now suppose RE is increased by 400Ω . Once again, estimate the sensitivity of C I , B I and VBE to variation in R2 . What can you infer about the sensitivity of the circuit parameters to variation in RE ? What happens to the collector emitter potential drop and what will be the potential pitfall if RE is varied in this manner.

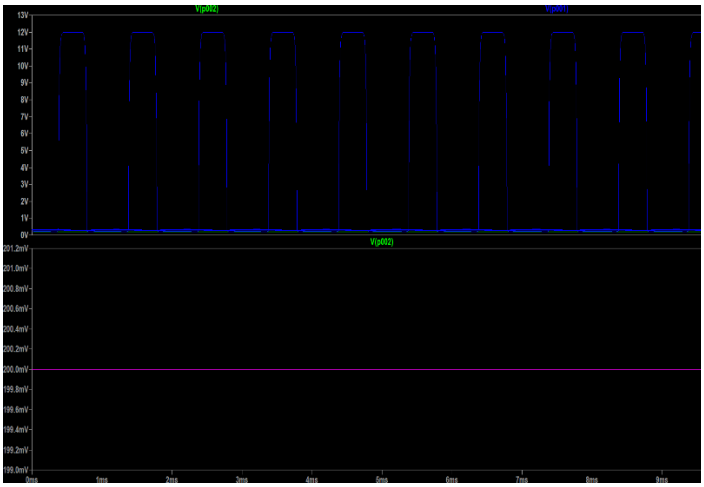




On increasing RE, IE decreases which causes decrease in current in different wires of circuit and voltages also dcreases as a result but VRE remains constant.

C. Now add a small signal of amplitude 1mV and frequency 1KHz to the base. Obtain the timing waveform for input signal Vin and Vout for 10ms. Choose coupling capacitors of value 100µF.





D. Study the effect of RE on VRE and voltage gain AV.

Soln: VRE always remains constant but it changes when RE is infinity. This is the case when all voltages drop across it.

On increasing VRE, Voltage gain AV increases and vice-versa.

As we can see from above example that we can control AV(voltage gain) and voltages and current at different positions by changing some elements in circuit.

On changing one element, it may change some of mentions or may all depending on how it is related.

5.Conclusion