COMMON EMITTER AMPLIFIER USING BC547 TRANSISTOR

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INTRODUCTION:

Amplifier is genrally used to boost the signal strength. For this purpose BJT, MOSFET are commonly used. But transistors cannot be directly used as amplifier because of the following reasons,

1. Below 0.7 v the device will not conduct, transistor remains off.
2. During reverse bias the device will not conduct.

To avoid these problems voltage divider biasing is used.

Common Emitter Amplifier is a single stage bipolar junction transistor which is based on voltage divider biasing and uses two resistors for the purpose of biasing. Common emitter amplifier is well suited for voltage amplification at low frequencies and is used in low noise amplifiers.

WORKING:

Common Emitter Amplifier is designed with BC547 transistor. BC547 is an NPN Bipolar Junction Transistor.This circuit consists of base terminal which acts as input, collector terminal which acts as output and emitter terminal which connects to either ground or power supply. The input signal applied is an A.C. signal.When an input signal is applied across emiiter base junction the forward bias increases and increases the collector current across R3 and increases the voltage drop. During negative half cycle the forward bias decreases and decreases the collector current across R3 . The resistors R1, R2, R4 are used for voltage biasing and for maintaining stability. The C1 capacitor is used to couple the input signal to base. Capacitor C1 blocks DC and allows only AC signals. C2 capacitor couples the output signal from collector to output. C1 and C2 are called as coupling capacitors. The capacitor C3 is used in parallel with R4 to avoid voltage drop across R4.Therefore an alternating A.C. voltage is applied to the base terminal of BJT and the output is collected from the collector terminal of BJT. Thus by using voltage divider biasing and coupling capacitors common emitter amplifier inverts and amplifies the input signal and gives it at the output terminal.

ADVANTAGES OF COMMON EMITTER AMPLIFIER:

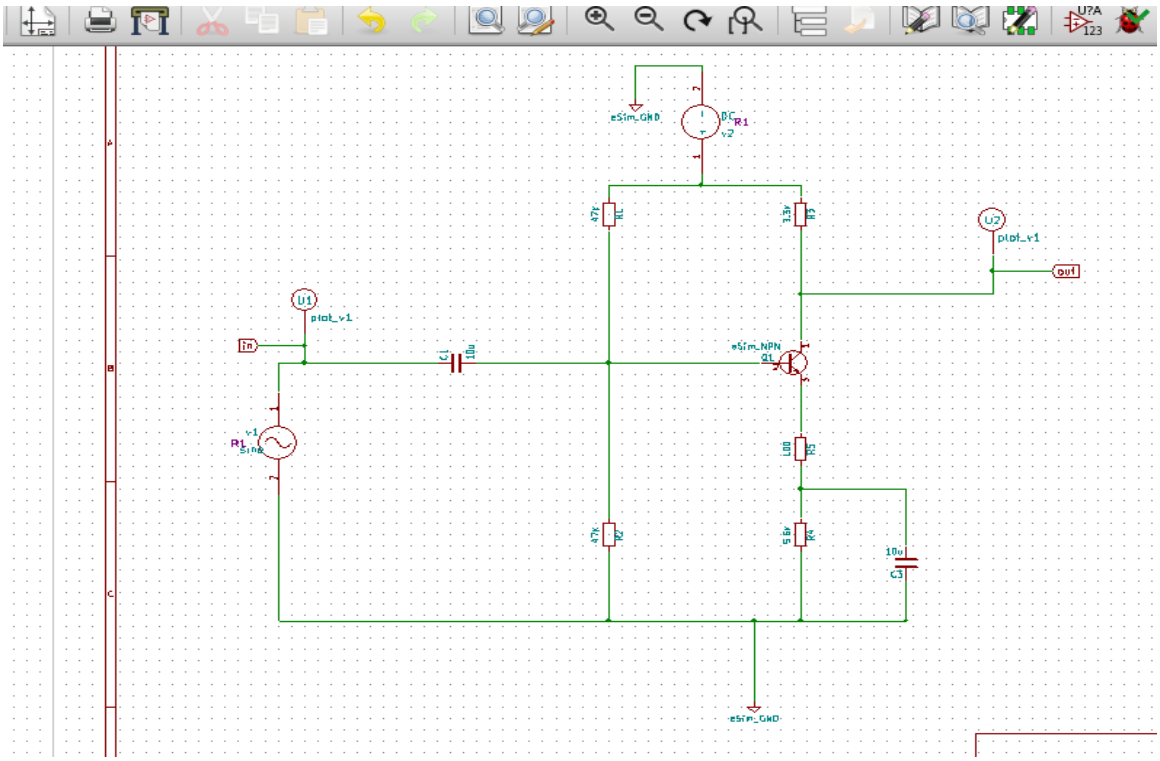
Some of the advantages of common emitter amplifier are as folows,

1.Higher voltage gain and power gain,

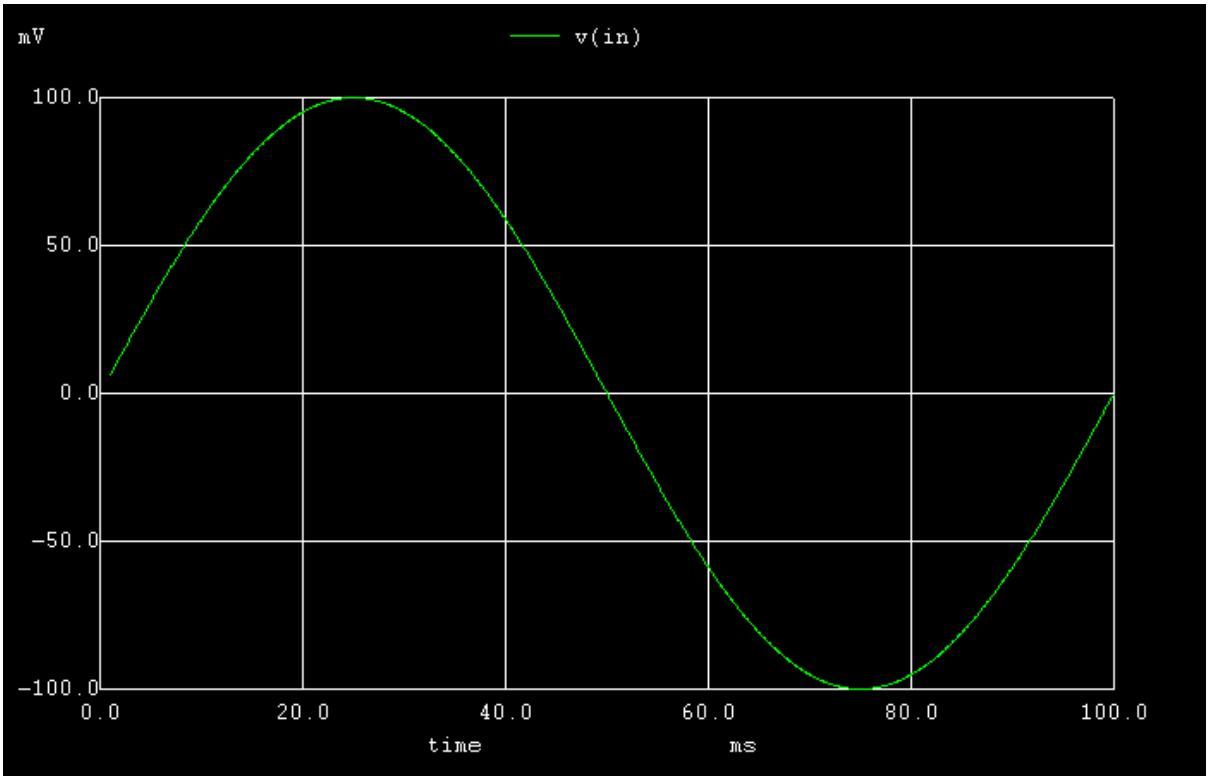
2.Low input impedance ,

3.High output impedance.

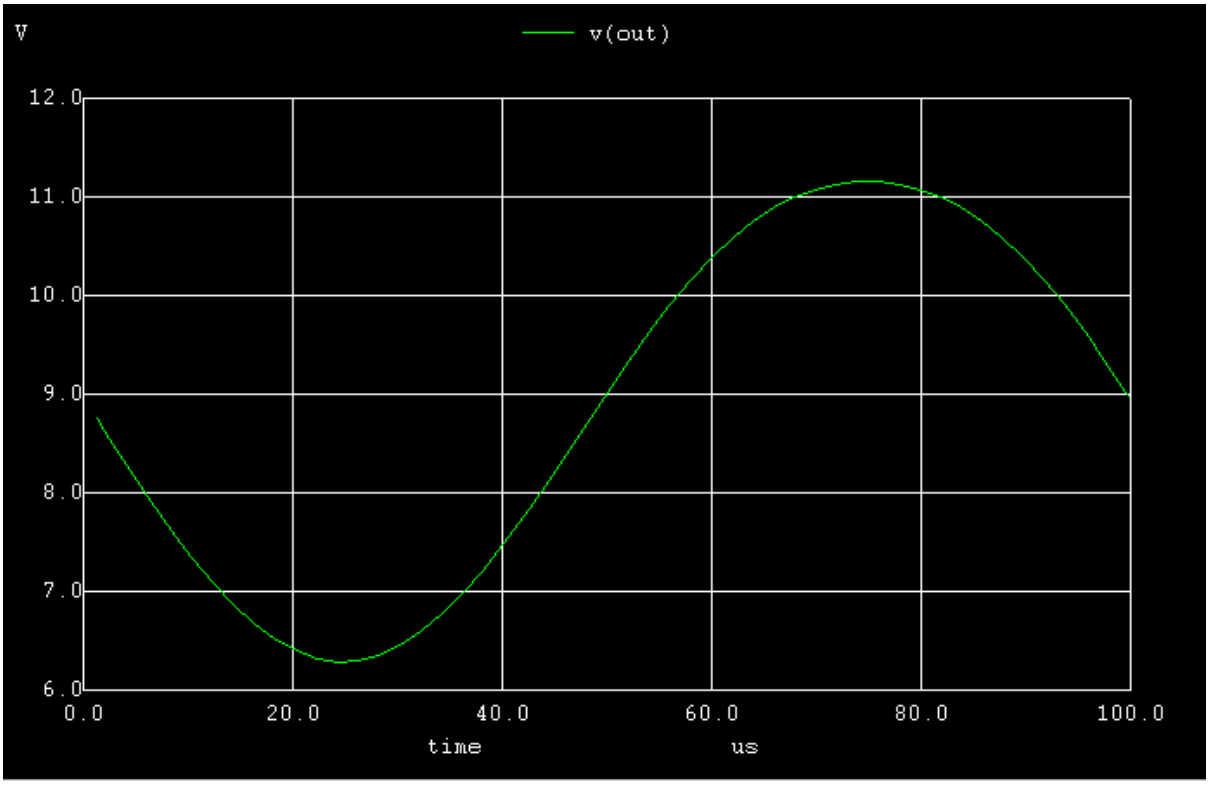
CIRCUIT DIAGRAM:



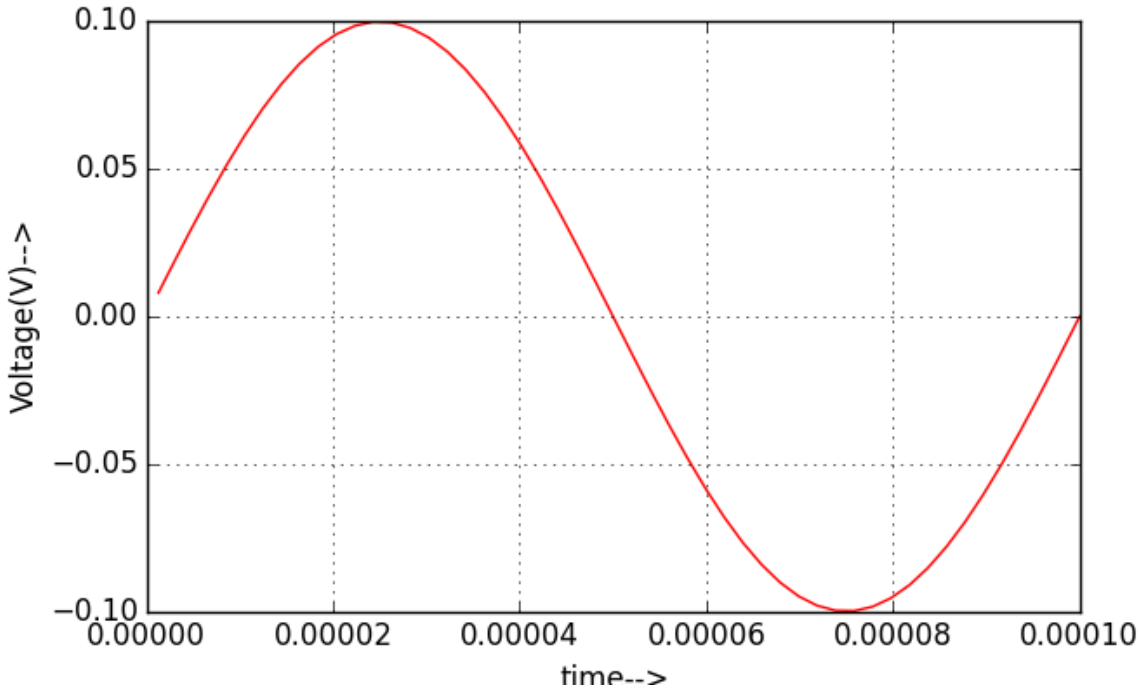
NGSPICE INPUT PLOT:



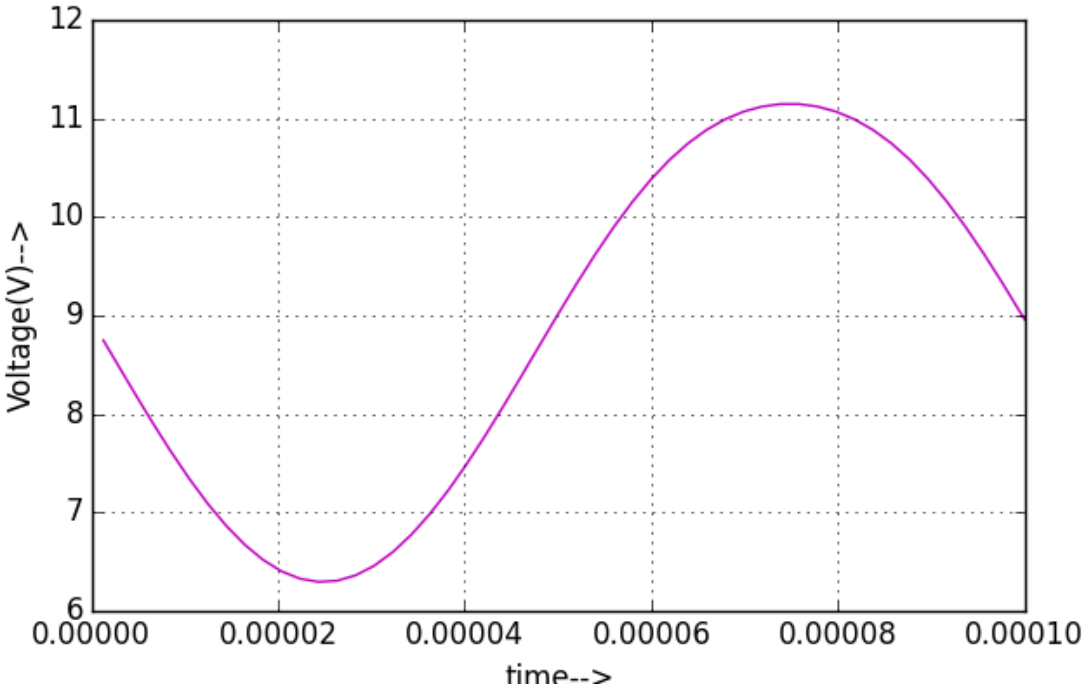
NGSPICE OUTPUT PLOT:



PYTHON INPUT PLOT:



PYTHON OUTPUT PLOT:



REFERENCES:

https://www.electronics-tutorials.ws/amplifier/amp_2.html.

https://images.app.goo.gl/VHNk3cfivQ8yG4on7.

CONCLUSION:

Thus the Common Emitter Amplifier using BC547 is designed and the output waveform is obtained successfully using eSim software.