EE 212 (Electronic Devices Lab)

Experiment-3

BJT Common Emitter Amplifier Characteristics

Group Info:

1. Manvi Baghel (200020025)
2. Shashi Prabha (200020043)

NGSPICE Code:

```
Question 1
*BJT Common Emitter Amplifier Characteristics
Vcc 3 0 dc=12
*Vin 4 0 0.8
*Vdummy 1 2 0
R1 3 4 34k
R2 4 0 10k
RC 2 3 5k
Re 6 0 2k
Q1 2 4 6 Q2N2222A

.MODEL Q2N2222A NPN(IS=8.11E-14 BF=205 VAF=113 IKF=0.5
ISE=1.06E-11 + NE=2 BR=4 VAR=24 IKR=0.225 RB=1.37 RE=0.343
RC=0.137 CJE=2.95E-11 + TF=3.97E-10 CJC=1.52E-11 TR=8.5E-8
XTB=1.5)


.control
op
*dc vcc 0 10 1 vin 0.7 0.8 0.02
```

```
dc
run
set color0=white
set color1=black
set xbrushwidth=2
print v(6)/2k
print v(4)
print v(2)
.endc
.end
```

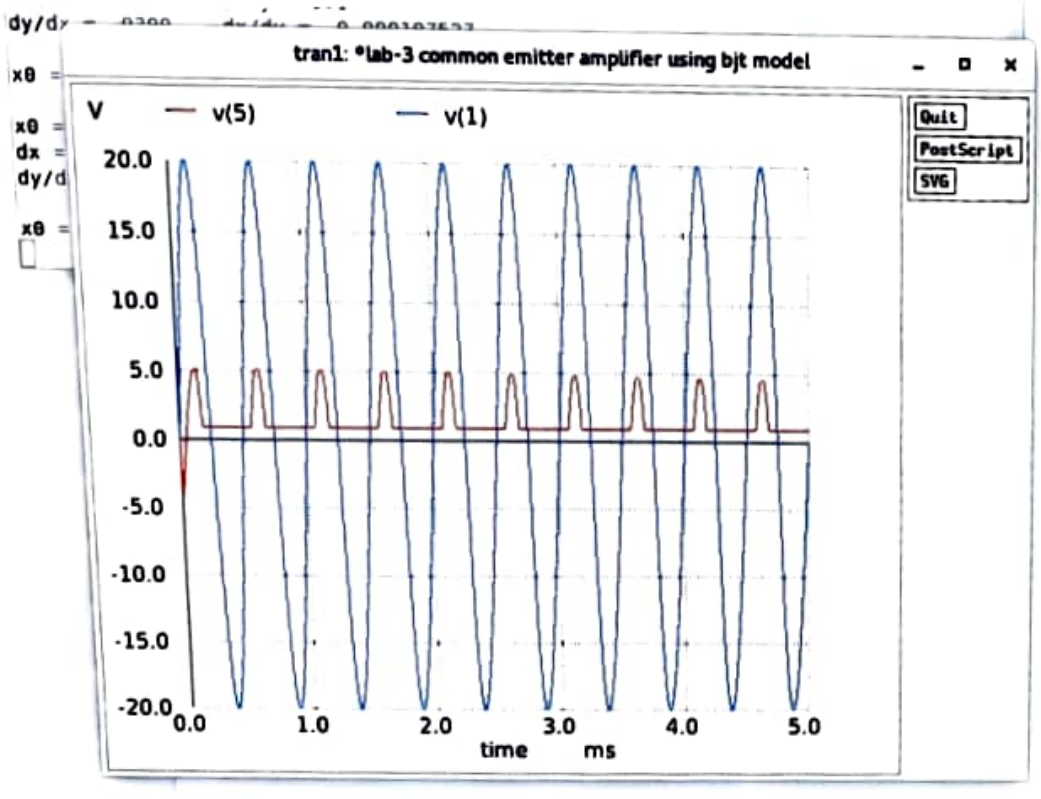
Question 2

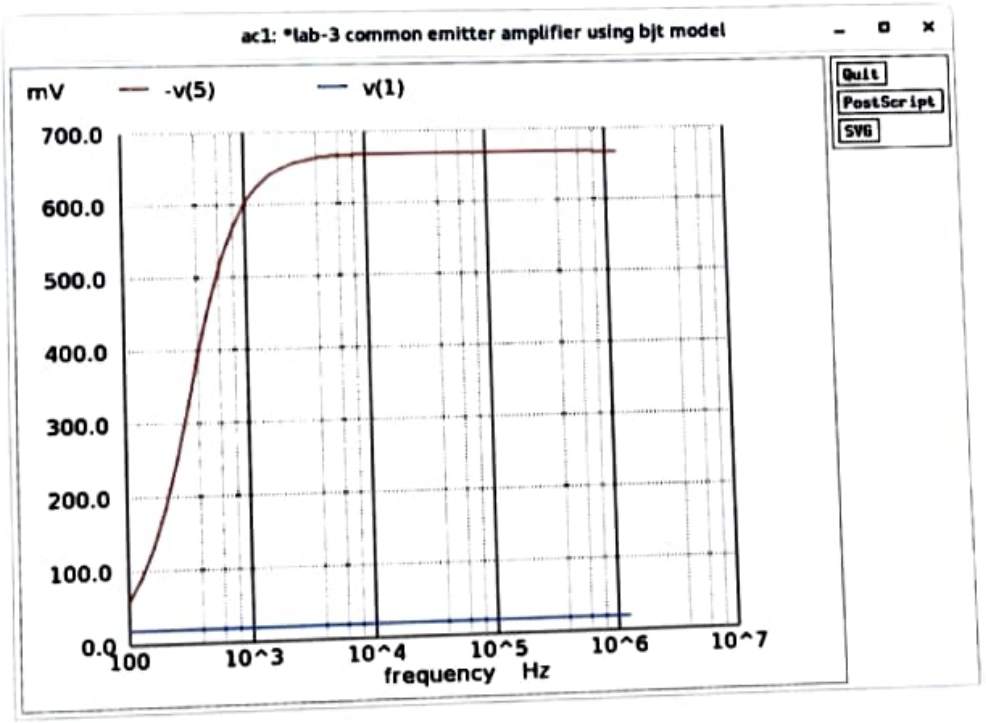
```
*BJT Common Emitter Amplifier Characteristics

.MODEL Q2N2222A NPN(IS=8.11E-14 BF=205 VAF=113 IKF=0.5
ISE=1.06E-11 + NE=2 BR=4 VAR=24 IKR=0.225 RB=1.37 RE=0.343
RC=0.137 CJE=2.95E-11 + TF=3.97E-10 CJC=1.52E-11 TR=8.5E-8
XTB=1.5)

Vcc 3 0 12V
Vin 4 0 dc 0.001 ac 10mV SIN (0 10mV 1KHz)
Cb 4 8 20.74u
Ce 6 0 79.61u
Cc 2 7 19.9u
Rc 3 2 5k
R1 3 8 33k
R2 8 0 10k
Re 6 0 2k
Q1 2 8 6 Q2N2222A
Rl 7 0 1k
```

```
.ac dec 10 100 100000k
.control
Tran 1u 5m
plot v(7), v(4)
run
plot -v(7)/v(4)

.endc
.end
```

Output:

R1 - 36k
Rc - 5k
R2 - 10k





Discussion:

Manvi: I got to know how to find out current and voltage values. Also, we learned plot graphs for a common emitter amplifier using ngspice. We learned to do proper biasing on the performance of BJT amplifier.

Shashi: We did experiment of common emitter amplifier with BJT model a) without capacitor and b) with capacitor, wrote the netlist on ngspice at the end plotted graphs of gains and frequency.we also learned how to use function generator.