EW-2 Project

SOUND AMPLIFIER

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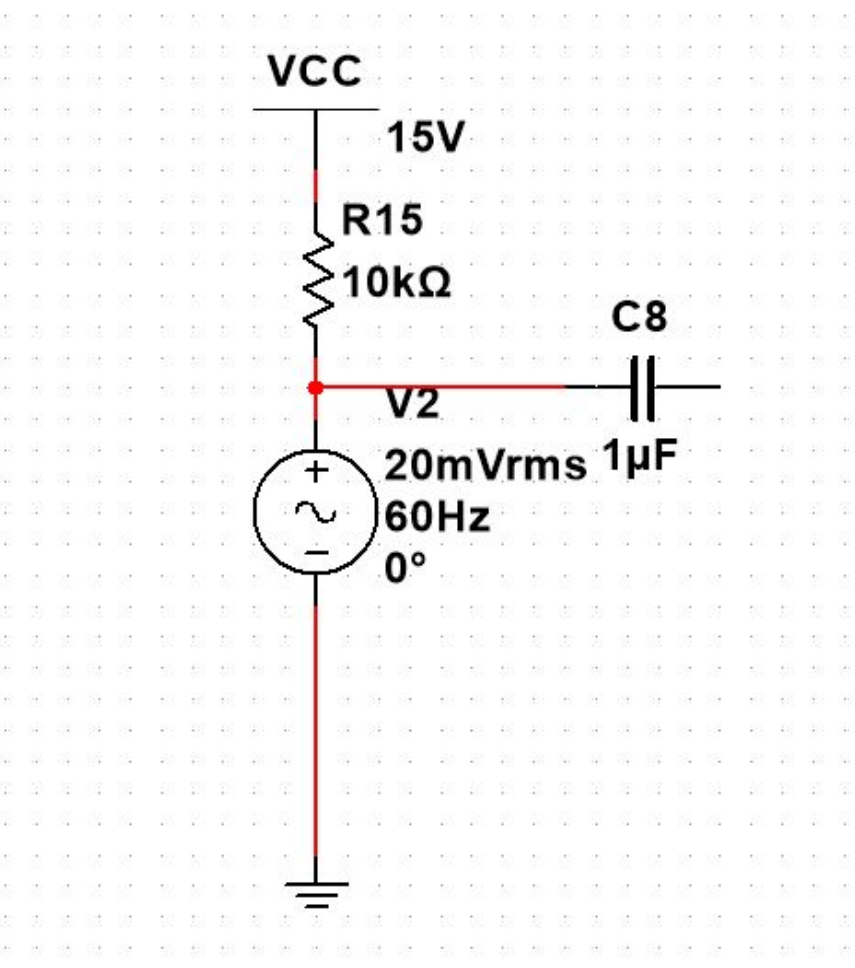
Proposed Design

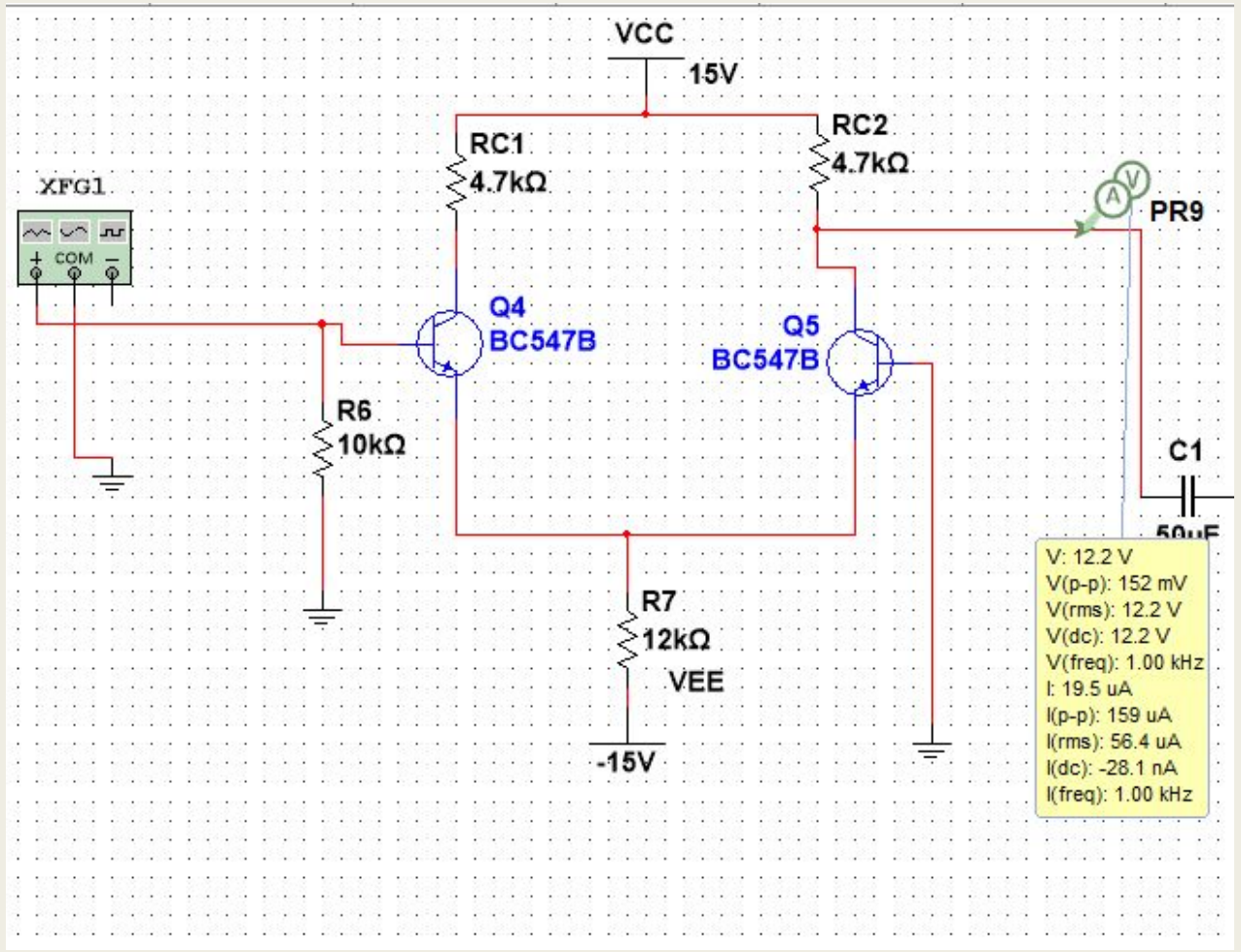
- An audio amp consists of an input source(mic) with peak-to-peak input of 10-20mV.
- A pre-amp stage
- A gain stage . Multiplication of both the gains will be around 500.
- A Volume control(if possible).
- A low band-pass filter with a pass range of(20Hz-20kHz).
- A power amplifier.
- A Load of around 8 ohms, into the output.

Microphone



This is a standard circuit for a mic. A 10 kOhms resistor is used to control sensitivity of the mic and the capacitor is used to remove the DC component, so that only AC signal passes.

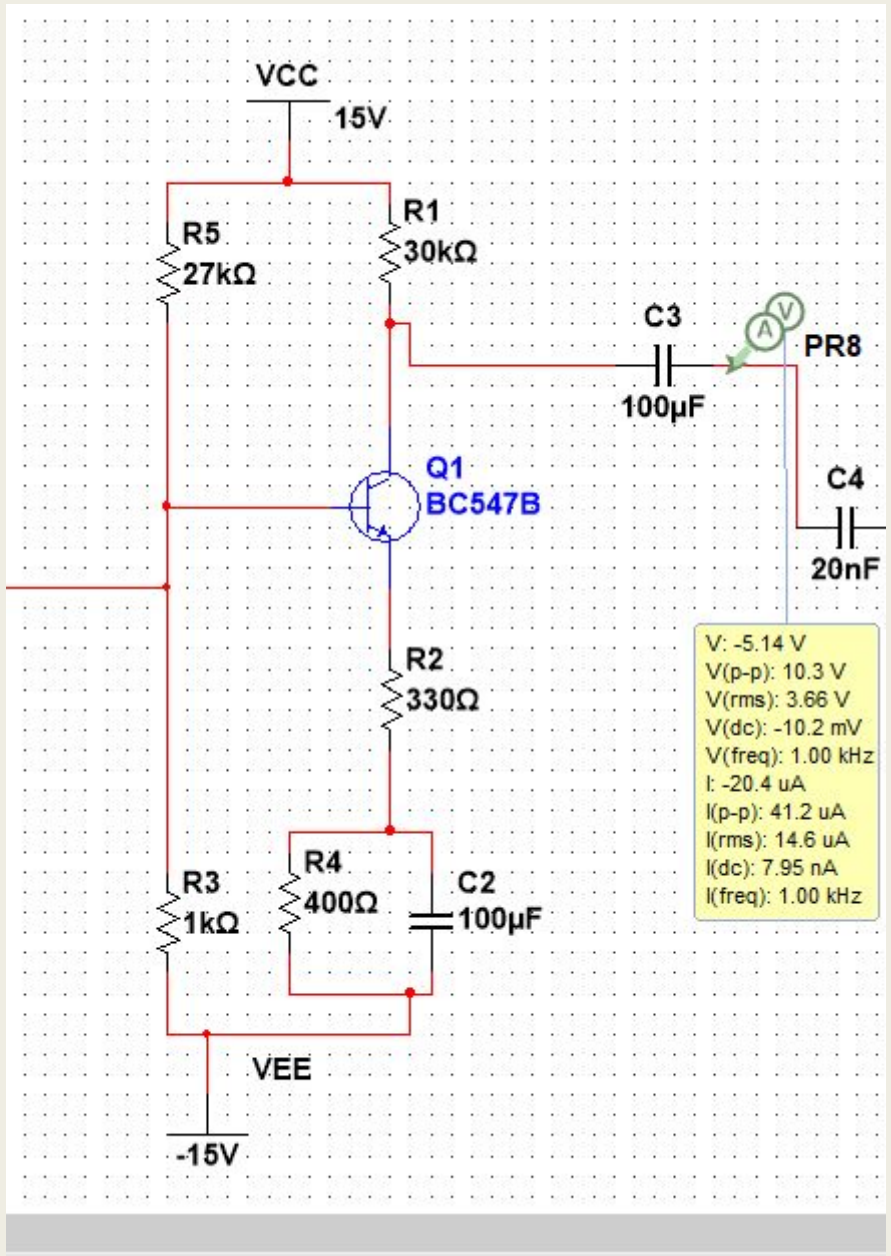
Pre-Amplifier Stage



- The Pre-amp stage basically consists of a Differential amplifier as shown in the picture on the previous slide.
- Gain = 9

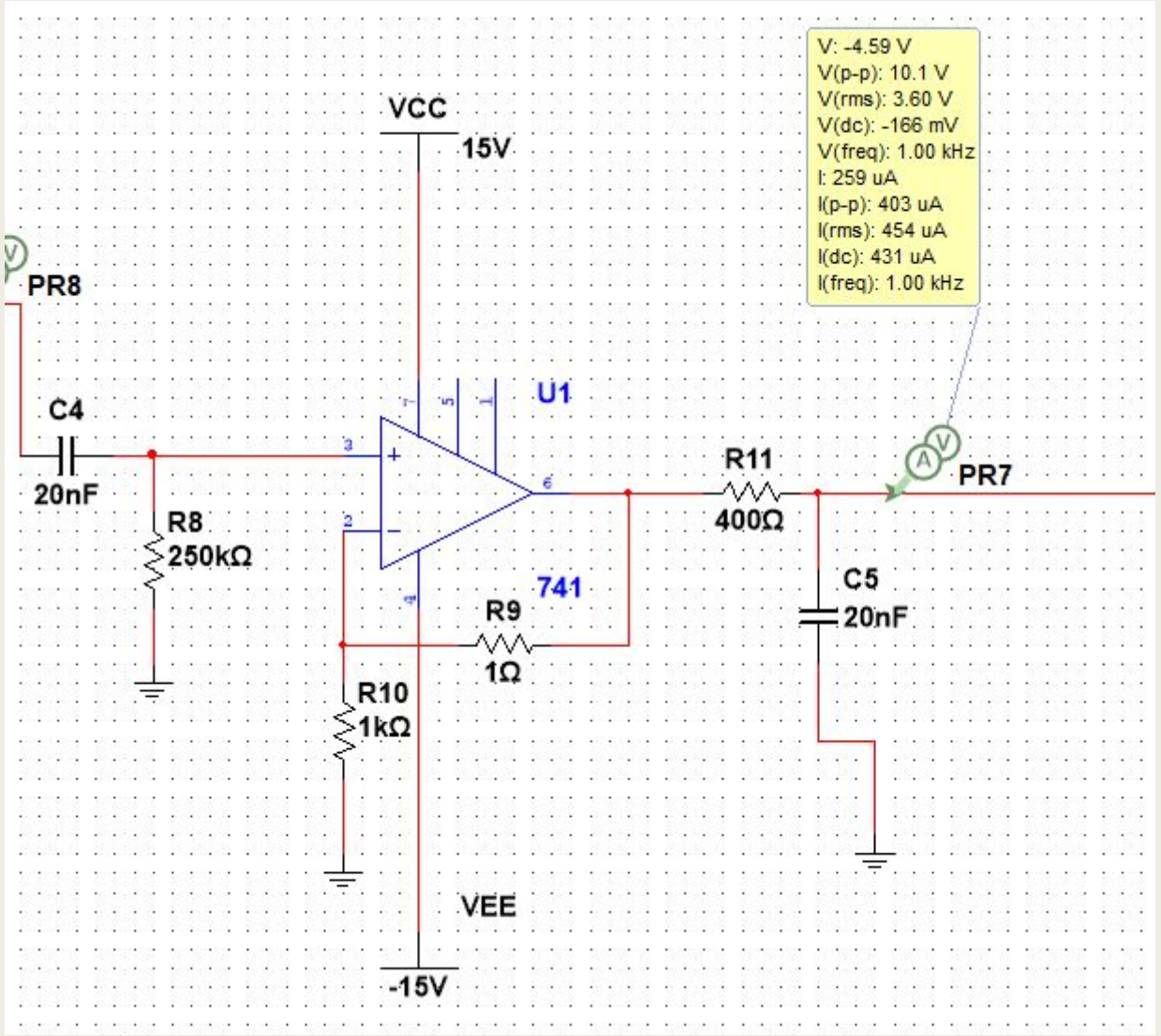
Gain Stage

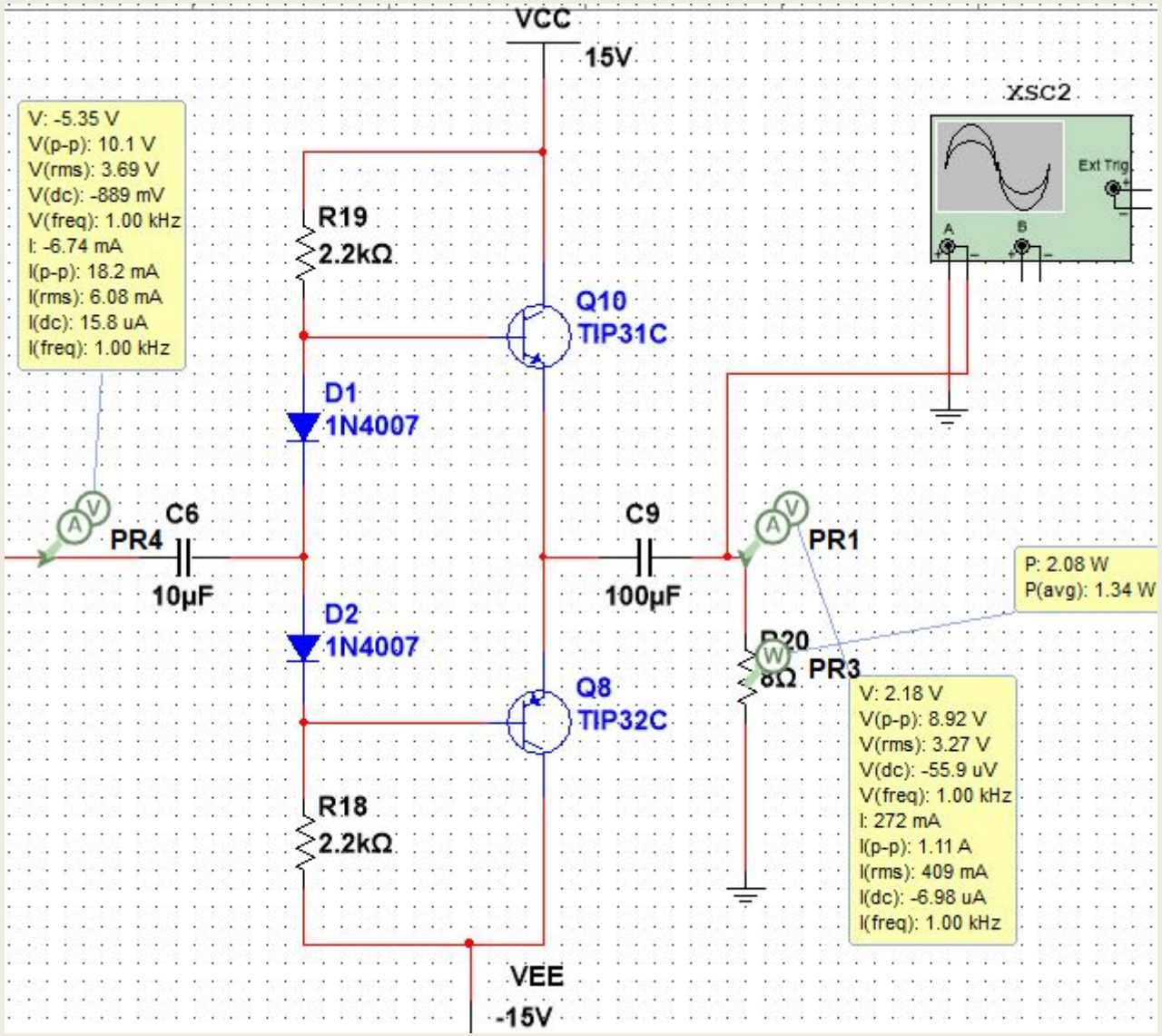
- The Gain Stage will be a BJT amplifier with which the input impedance matches with the output impedance of the Pre-amplifier stage and the output impedance matches with the input impedance of the Filter or Volume Control stage.
- Gain of common-emitter amplifier = 45


VCC
15V
R5
27kΩ
R1
30kΩ
C3
100µF
PR8
Q1
BC547B
C4
20nF
V: -5.14 V
V(p-p): 10.3 V
V(rms): 3.66 V
V(dc): -10.2 mV
V(freq): 1.00 kHz
I: -20.4 uA
I(p-p): 41.2 uA
I(rms): 14.6 uA
I(dc): 7.95 nA
I(freq): 1.00 kHz
R2
330Ω
R4
400Ω
C2
100µF
R3
1kΩ
VEE
-15V

Filter

- The filter will be done using a IC, IC 741, which will be designed as a low bandpass filter.
- We used an active filter with gain of 0.95
- The cutoff frequency are set at 32Hz and 19.8kHz


V: -4.59 V
V(p-p): 10.1 V
V(rms): 3.60 V
V(dc): -166 mV
V(freq): 1.00 kHz
I: 259 uA
I(p-p): 403 uA
I(rms): 454 uA
I(dc): 431 uA
I(freq): 1.00 kHz
VCC
15V
PR8
C4
20nF
R8
250kΩ
U1
741
R9
1Ω
R10
1kΩ
VEE
-15V
R11
400Ω
C5
20nF
PR7


VCC
15V
XSC2
Ext Trig
A
B
V: -5.35 V
V(p-p): 10.1 V
V(rms): 3.69 V
V(dc): -889 mV
V(freq): 1.00 kHz
I: -6.74 mA
I(p-p): 18.2 mA
I(rms): 6.08 mA
I(dc): 15.8 uA
I(freq): 1.00 kHz
R19
2.2kΩ
Q10
TIP31C
D1
1N4007
C6
PR4
10µF
C9
100µF
PR1
P: 2.08 W
P(avg): 1.34 W
D2
1N4007
R20
8Ω
PR3
Q8
TIP32C
V: 2.18 V
V(p-p): 8.92 V
V(rms): 3.27 V
V(dc): -55.9 uV
V(freq): 1.00 kHz
I: 272 mA
I(p-p): 1.11 A
I(rms): 409 mA
I(dc): -6.98 uA
I(freq): 1.00 kHz
R18
2.2kΩ
VEE
-15V

Power Amplifier

- We will be using a class AB power amplifier in our circuit as they have a sufficiently high efficiency(60%) and reduces distortion of signal near crossover region using a combination of diodes and resistors.
- Power output is 1.34W with Vrms = 3.27

Thank
You