Prelab 7 and 8

7/3/22

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## Part 1: Lab 7

### Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| V1 = 4 | V2 | IB | IC | IE | VCE |  |
|  | 0 | 11.5 uA | 7.94 uA | 3.56 uA | 4 | 0.715315 |
|  | 4 |  | 730 | 741 | 8 | 65.76577 |
|  | 8 |  | 768 | 779 | 12 | 69.18919 |
|  | 12 |  | 806 | 817 | 16 | 72.61261 |
|  | 24 |  | 919 | 930 | 28 | 82.79279 |
|  | 30 | 11.1 | 987 mA | 975 uA | 34 | 88.91892 |
|  | 50 |  | 1.17 | 1.18 | 54 | 105.4054 |
|  | 75 |  | 1.40 | 1.41 | 79 | 126.1261 |
|  | 100 |  | 1.64 | 1.65 | 104 | 147.7477 |
|  | 150 |  | 2.11 | 2.12 | 154 | 190.0901 |
|  | 202 | 11.1 | 2.60 | 2.61 | 206 | 234.2342 |
| V1 = 6 | 0 | 18.1 uA | 10.5 uA | 7.61 uA | 6 | 0.589888 |
|  | 4 |  | 1.24 mA | 1.25 mA | 10 | 69.66292 |
|  | 8 | 17.8 | 1.30 | 1.32 | 14 | 73.03371 |
|  | 12 |  | 1.36 | 1.38 | 18 | 76.40449 |
|  | 24 |  | 1.55 | 1.57 | 30 | 87.07865 |
|  | 30 |  | 1.65 | 1.67 | 36 | 92.69663 |
|  | 50 |  | 1.97 | 1.99 | 56 | 110.6742 |
|  | 75 |  | 2.37 | 2.39 | 81 | 133.1461 |
|  | 100 |  | 2.77 | 2.79 | 106 | 155.618 |
|  | 150 |  | 3.57 | 3.58 | 156 | 200.5618 |
|  | 200 |  | 4.37 | 4.38 | 206 | 245.5056 |
| V1 = 8 | 0 | 24.7 uA | 12.3 uA | 12.5 uA | 8 | 0.497976 |
|  | 8 |  | 1.85 mA | 1.87 mA | 16 | 74.89879 |
|  | 16 |  | 2.03 | 2.05 | 24 | 82.18623 |
|  | 24 |  | 2.21 | 2.23 | 32 | 89.47368 |
|  | 30 |  | 2.35 | 2.37 | 38 | 95.1417 |
|  | 50 |  | 2.80 | 2.83 | 58 | 113.3603 |
|  | 75 |  | 3.37 | 3.39 | 83 | 136.4372 |
|  | 100 |  | 3.94 | 3.96 | 108 | 159.5142 |
|  | 150 |  | 5.07 | 5.10 | 158 | 205.2632 |
|  | 198 |  | 6.19 | 6.16 | 206 | 250.6073 |
| V1 = 10 | 0 | 31.4 uA | 13.6 uA | 17.8 uA | 10 | 0.43871 |
|  | 5 | 31 | 2.31 mA | 2.34 mA | 15 | 74.51613 |
|  | 10 |  | 2.46 | 2.49 | 20 | 79.35484 |
|  | 30 |  | 3.05 | 3.08 | 40 | 98.3871 |
|  | 50 |  | 3.64 | 3.67 | 60 | 117.4194 |
|  | 75 |  | 4.38 | 4.41 | 85 | 141.2903 |
|  | 100 |  | 5.12 | 5.15 | 110 | 165.1613 |
|  | 150 |  | 6.59 | 6.63 | 160 | 212.5806 |
|  | 196 |  | 7.95 | 7.98 | 206 | 256.4516 |

VCE = VCB + VBE -> V2 + V1

VCE = VCC - ICRC

### Multisim

Diagram, schematic

Description automatically generated

**Figure 1.** Lab 7 circuit

### Plot

I have no idea as of right now how to calculate and find the q point. I also don’t think my plot is correct.

Chart

Description automatically generated

**Figure 2.** Characteristic curves

## Part 2: Lab 8

Diagram, schematic

Description automatically generated

**Figure 3.** BJT Amplification Common Collector in Multisim

### Table

|  |  |  |
| --- | --- | --- |
| F(HZ) | VOUT | Gain(db) |
| 10 | 0 | -4.967 |
| 30 | clipped |  |
| 60 | clipped |  |
| 100 | 2.827 mV | 0.005654 |
| 200 | 5.563 mV | 0.011126 |
| 1k | 28.378 mV | 0.056 |
| 2k | 56.438 mV | 0.112876 |
| 5k | 141.525 mV | 0.28305 |
| 10k | 282.783 mV | 0.565566 |
| 15k | 425.865 mV | 0.85173 |
| 20k | 565.777 mV | 1.131554 |
| 50k | 1.425 | 2.85 |
| 75k | 2.125 | 4.25 |
| 100k | 2.809 | 5.618 |
| 150k | 3.952 | 7.904 |
| 200k | 4.418 | 8.836 |
| 500k | 4.458 | 8.916 |
| 750k | Clipped (same as above) | 8.916 |
| 1M | clipped | 8.916 |
| 1.5M | Clipped | 8.916 |
| 2M | clipped | 8.916 |

Gain: Vout/500mV

At 200k Hz the waveform starts to become clipped and further gets clipped from then on

### Plot

**Figure 4.** Plot of Gain

### Output Waveforms

Graphical user interface

Description automatically generated

**Figure 5.** 10 Hz waveform Output

A picture containing graphical user interface

Description automatically generated

**Figure .** 2M Hz Output Waveform