Midterm

7//2022

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## Observations for Full and Half Wave rectifier

In both cases they only let in the positive half waves from the AC signal. For the half wave the Vout was about 70 v and for the full wave it was 63. There is no filter on either one which probably would’ve helped the output look better. The full wave has more of a point to each hill of its waveform because it has two diodes and the second diode is filling in some of the space between hills that you see with the half wave rectifier.

## Observations & Notes for Band Pass Filter

Vin was 1.41 volts. The range of frequencies found with the bode plotter was 87 – 390 Hz with the center frequency around 200 Hz. This can be seen where gain rises and then stays stead at about -8 until it starts dropping again at 500 Hz. The center frequency can be seen by the data collected where at 200 Hz the frequency was at its highest and on either side of that is where it starts to drop.

For phase calculations, the component values on the left were used with the low pass equation and the values on the right were used with the high pass equation. Then, low and high was added together and converted to degrees from radians. A snippet of the full calculated values in excel are shown in Figure 10. I’m not entirely sure about the phase calculations, while running the simulation though at about 200 Hz is when the waveforms were in phase, at other frequencies it was slightly out of phase.

# Half Wave

### Circuit

Diagram, schematic

Description automatically generated

**Figure 1.** Half Wave Rectifier

### Waveforms

A picture containing chart

Description automatically generated

**Figure 2.** Input and Output Waveforms

# Full Wave

### Circuit

Diagram, schematic

Description automatically generated

**Figure 3.** Full Wave Rectifier

### Waveform

A picture containing graphical user interface

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**Figure 4.** Input and Output Waveforms

# Band Pass Filter

### Table

|  |  |  |  |
| --- | --- | --- | --- |
|  | Band Pass Filter | | |
| F(HZ) | Vout | Gain(db) | Phase Angle(deg) |
| 25 | 0.285 | -13.8875 | 119 |
| 50 | 0.426 | -10.3962 | 56 |
| 75 | 0.48 | -9.35956 | 33 |
| 100 | 0.51 | -8.83298 | 21 |
| 150 | 0.523 | -8.61435 | 6.3 |
| 200 | 0.528 | -8.5317 | -2.2 |
| 300 | 0.517 | -8.71457 | -16 |
| 500 | 0.471 | -9.52396 | -38 |
| 600 | 0.421 | -10.4987 | -49 |
| 700 | 0.419 | -10.5401 | -58 |
| 800 | 0.393 | -11.0965 | -67 |
| 900 | 0.351 | -12.0782 | -77 |
| 1000 | 0.331 | -12.5878 | -86 |

### Circuit

Diagram, schematic

Description automatically generated

**Figure 5.** Band Pass Filter

### Outputs and Plots

**Figure 6.** Gain vs Frequency of Band Pass Filter

**Figure 7.** Phase Angle vs Frequency of Band Pass Filter

A picture containing graphical user interface

Description automatically generated

**Figure 8.** Bode Plot of Magnitude

A screenshot of a computer

Description automatically generated with low confidence

**Figure 9.** Bode Plot of Phase angle

Graphical user interface, application, table, Excel

Description automatically generated

**Figure 10.** Calculations for Phase angle