Solutions to the Lab Problems

Below is a block diagram representation of a system that filters the components of an input signal with frequencies in the range [1K, 3K] Hz.

![Block Diagram](image)

The transfer function of the first block can be obtained by the command:

```matlab
> [num1, den1] = makefilter('lowpass', 'butter', -2, -20, 6000*pi, 6000*pi + 1000);
```

The transfer function of the second block can be obtained by the command:

```matlab
> [num2, den2] = makefilter('highpass', 'butter', -2, -20, 2000*pi, 2000*pi - 1000);
```

Then, using the `series` function, we can get the transfer function of the whole system.

```matlab
> [num, den] = series(num1, den1, num2, den2);
```

To print the transfer function, type:

```matlab
> printsys(num, den);
```

Finally, the system can be tested using the command:

```matlab
> runfilter(num, den, 'sm1_cln_32k.wav');
```

For the second the system that suppresses the components with frequencies in the range [1K, 3K] Hz, the corresponding block diagram representation is given below. Similar to the first system, the corresponding transfer function can be obtained as follows:
> [num1, den1] = makefilter('lowpass', 'butter', -2, -20, 2000*pi, 2000*pi + 1000);
> [num2, den2] = makefilter('highpass', 'butter', -2, -20, 6000*pi, 6000*pi - 1000);
> [num, den] = parallel(num1, den1, num2, den2);