In [23]:

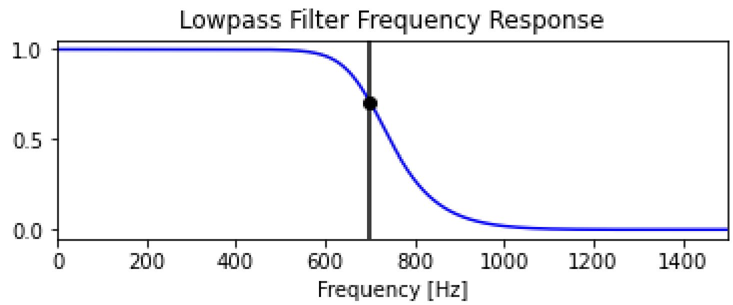
```
import numpy as np
from scipy.signal import butter, lfilter, freqz
import matplotlib.pyplot as plt


# Filter requirements.
order = 6
fs = 3000       # sample rate, Hz
cutoff = 700  # desired cutoff frequency of the filter, Hz

nyq = 0.5 * fs
normal_cutoff = cutoff / nyq
b, a = butter(order, normal_cutoff, btype='low', analog=False)

# Plot the frequency response.
w, h = freqz(b, a, worN=8000)
plt.subplot(2, 1, 1)
plt.plot(0.5*fs*w/np.pi, np.abs(h), 'b')
plt.plot(cutoff, 0.5*np.sqrt(2), 'ko')
plt.axvline(cutoff, color='k')
plt.xlim(0, 0.5*fs)
plt.title("Lowpass Filter Frequency Response")
plt.xlabel('Frequency [Hz]')

plt.show()
```



In [20]:

```
fc= 700 # cut off frequency
R = 10000 # assumed resistor
fc= fc * 2 *3.14 # converting frequency to radians
C = 1/(fc*R)
C
```

Out[20]: 2.2747952684258418e-08

In [19]:

```
## 22pf is closest actual capacitor value
R = 10
C = 22pf
```

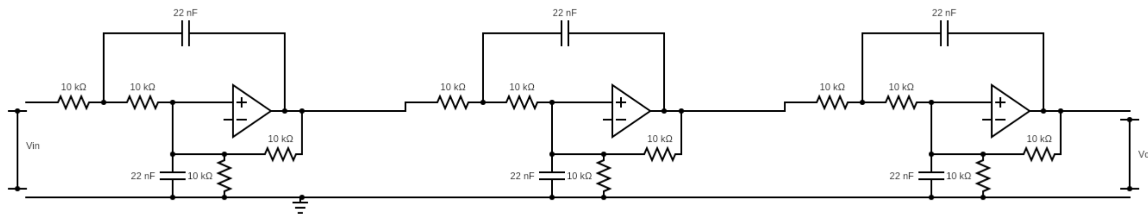
Out[19]: 2.2747952684258418e-08

Using the analysis above we can see we need a 6th order butterworth filter with a cutoff frequency of 700 Hz

Then using the formula

fc= 1/CR we can calculate the resitance an capacitence values as above

Finally in order to procduce our circuit we stack 3 3nd order butterworth filters



In [ ]: