

EXPERIMENT NO.7

AIM: Design and implementation of IIR filter to meet given specifications.

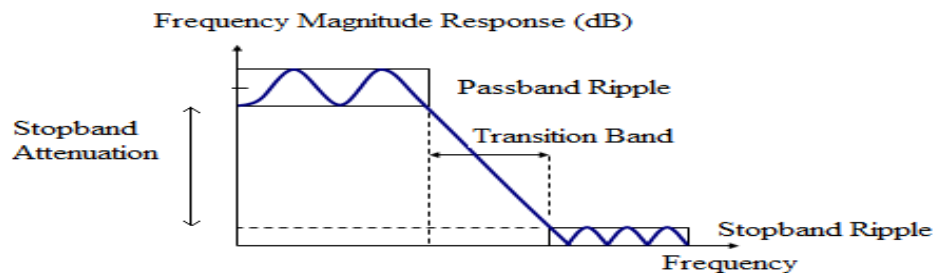
APPARATUS: MATLAB software

THEORY:

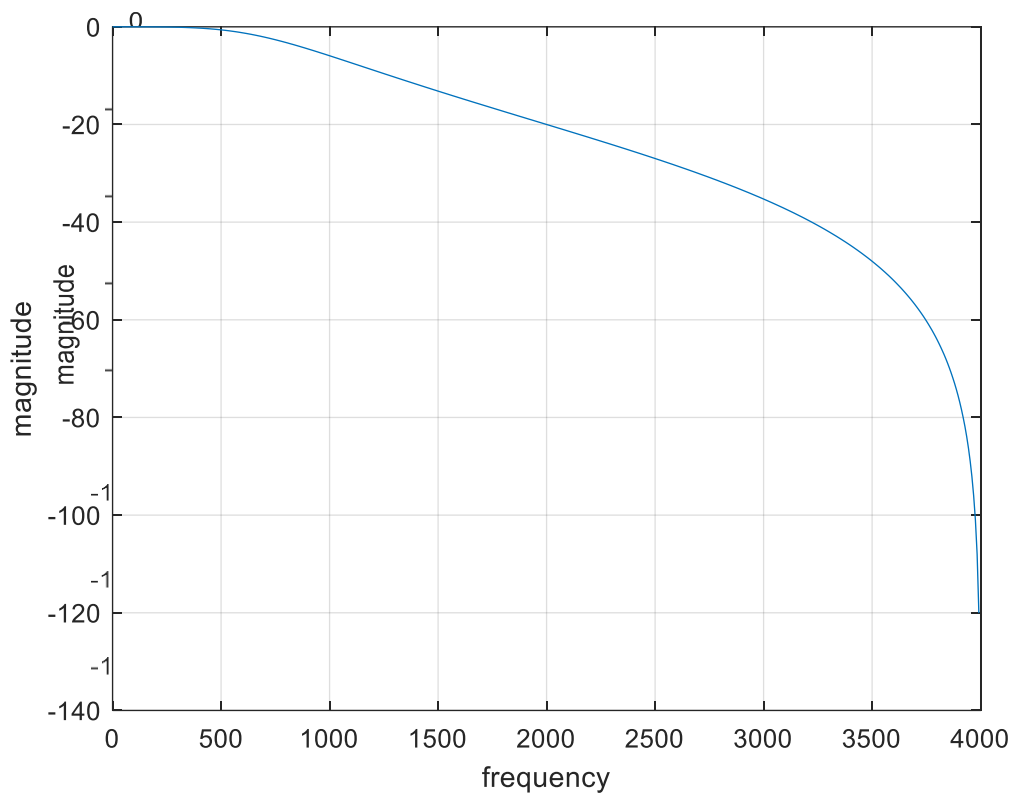
The infinite impulse response (IIR) filter is a recursive filter in that the output from the filter is computed by using the current and previous inputs and previous outputs. The types of filters which make use of feedback connection to get the desired filter implementation are known as recursive filters. Their impulse response is of infinite duration. So they are called IIR filters.

IIR filters are designed by considering all the infinite samples of the impulse response. The impulse response is obtained by taking inverse Fourier transform of ideal frequency response. There are several techniques available for the design of digital filters having an infinite duration unit impulse response. The popular methods for such filter design uses the technique of first designing the digital filter in analog domain and then transforming the analog filter into an equivalent digital filter because the analog filter design techniques are well developed. Various methods of transforming an analog filter into a digital filter and methods of designing digital filters are discussed.

IIR filter can be designed using (a) bilinear transformation method (b) Impulse invariant transformation method

**PROGRAM:**

```
wp = 500;
ws = 2000;
rp = 3;
rs = 20;
fs = 8000;
fn = fs/2;
[n,wc] = buttord(wp/fn,ws/fn,rp,rs)
[b,a] = butter(n,wc);
[h,f] = freqz(b,a,512,8000)
plot(f,20*log10(abs(h)))
grid
xlabel("frequency")
ylabel("magnitude")
```

OUTPUT:1**POST LAB QUESTION:**

Q1. Describe low pass, high pass, band pass and band stop filters in detail. Also define passband frequency, stopband frequency, passband ripple and stopband attenuation.