**AIM:**

        To write a program for FIR(Finite Impulse Response) filter like Low pass FIR filter, High pass FIR filter, Band pass FIR filter and Band stop FIR filter using Rectangular window using MATLAB in IT1254 - DSP and Communications Systems Lab.

**ALGORITHM:**

**LOW PASS FILTER:**

**Step 1:** Read the input sequence  
**Step 2:** Perform low pass filter calculations  
**Step 3:** Plot the output sequences

**HIGH PASS FILTER:**

**Step 1:** Read the input sequence  
**Step 2:** Perform high pass filter calculations  
**Step 3:** Plot the output sequences

**BAND PASS FILTER:**

**Step 1:** Read the input sequence  
**Step 2:** Perform band pass filter calculations  
**Step 3:** Plot the output sequences

**BAND STOP FILTER:**

**Step 1:** Read the input sequence   
**Step 2:** Perform band stop filter calculations  
**Step 3:** Plot the output sequences

**PROGRAM:**

clc;  
clear all;  
close all;  
rp=input('Enter the passband ripple(rp):');  
rs=input('Enter the stopband ripple(rs):');  
fp=input('Enter the passband frequency(fp):');  
fs=input('Enter the stopband  
frequency(fs):');  
f=input('Enter the sampling frequency(f):');  
wp=2\*fp/f;  
ws=2\*fs/f;  
num=-20\*log10(sqrt(rp\*rs))-13;  
dem=14.6\*(fs-fp)/f;  
n=ceil(num/dem);  
n1=n+1;  
if(rem(n,2)~=0)  
    n1=n;  
    n=n-1;  
end  
y=boxcar(n1);  
%Low pass filter  
b=fir1(n,wp,y);  
[h,o]=freqz(b,1,256);  
m=20\*log10(abs(h));  
subplot(2,2,1);  
plot(m);  
ylabel('Gain(db)->');  
xlabel('(a)Normalised frequency->');  
%High pass filter  
b=fir1(n,wp,'high',y);  
[h,o]=freqz(b,1,256);  
m=20\*log10(abs(h));  
subplot(2,2,2);  
plot(m);  
ylabel('Gain(db)->');  
xlabel('(b)Normalised frequency->');  
%Band pass filter  
wn=[wp\*ws];  
b=fir1(n,wn,y);  
[h,o]=freqz(b,1,256);  
m=20\*log10(abs(h));  
subplot(2,2,3);  
plot(m);  
ylabel('Gain(db)->');  
xlabel('(c)Normalised frequency->');  
%Band stop filter  
wn=[wp\*ws];  
b=fir1(n,wn,'stop',y);  
[h,o]=freqz(b,1,256);  
m=20\*log10(abs(h));  
subplot(2,2,4);  
plot(m);  
ylabel('Gain(db)->');  
xlabel('(d)Normalised frequency->');

**OUTPUT:**

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| [http://3.bp.blogspot.com/_V648gqhagYA/TPzt8DL8qcI/AAAAAAAAAdY/djnez36gZVk/s320/FIR-Filter-using-Rectangular-Window.PNG](http://3.bp.blogspot.com/_V648gqhagYA/TPzt8DL8qcI/AAAAAAAAAdY/djnez36gZVk/s1600/FIR-Filter-using-Rectangular-Window.PNG) |
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