Code:-

```
import numpy as np
from matplotlib import pyplot as plt
from scipy import signal

N=9

b1=signal.firwin(N,cutoff=0.5,window="rectangular")

b2=signal.firwin(N,cutoff=0.5,window="hamming")

b3=signal.firwin(N,cutoff=0.5,window="blackman")

a=1

w1,h1=signal.freqz(b1,a)
h1_dB=20*np.log10(abs(h1))

w2,h2=signal.freqz(b2,a)
h2_dB=20*np.log10(abs(h2))

w3,h3=signal.freqz(b3,a)
h3_dB=20*np.log10(abs(h3))
```

```
plt.figure(figsize=(10,6))
plt.plot(w1/max(w1),h1_dB,color="black",label='Rectangular Window')
plt.plot(w2/max(w2),h2_dB,color="red",label='Hamming Window')
plt.plot(w3/max(w3),h3_dB,color="blue",label='Blackman Window')

plt.grid()
plt.ylim(-150,5)
plt.ylabel('Magnitude (dB)')
plt.xlabel('Normalized Frequency(rad/sample)')
plt.title('frequency response of Low pass FIR filter with Different Windows')
plt.legend()

plt.show()

b1=np.float16(b1)
b2=np.float16(b2)
b3=np.float16(b3)

print("\n impulse response coefficient using Rectangular Window",b1)

print("\n impulse response coefficient using Hamming Window",b2)

print("\n impulse response coefficient using Blackman Window",b3)
```

OUTPUT:-

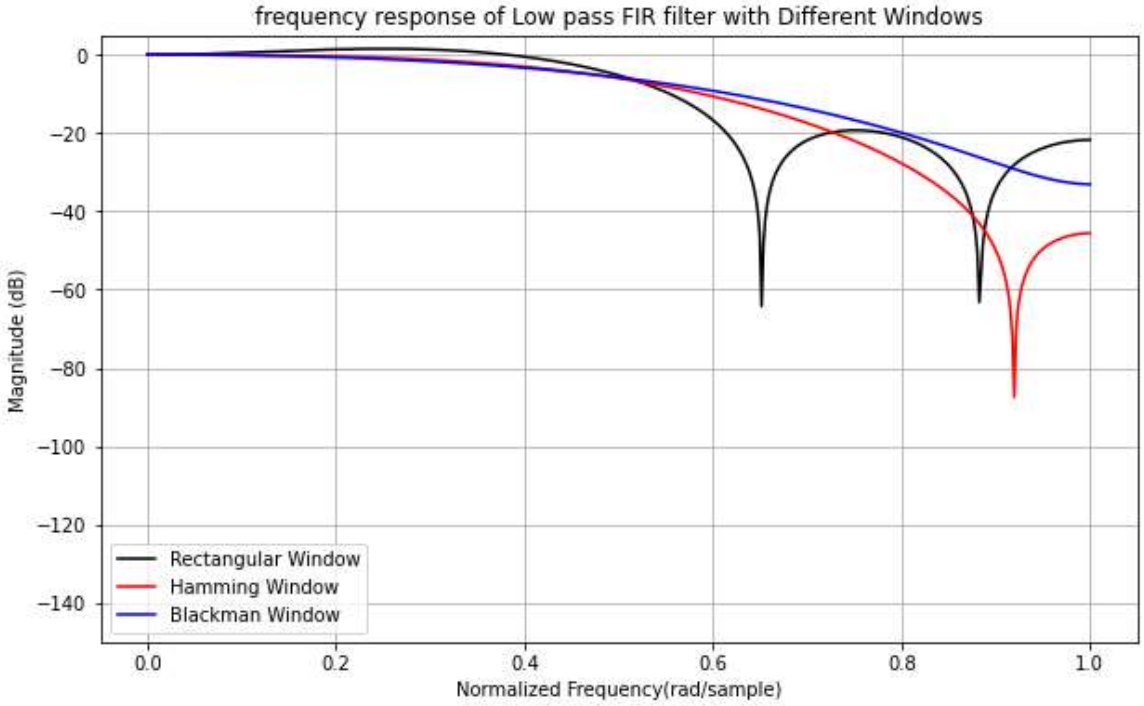
impulse response coefficient using Rectangular Window [-0. -0.1148 0. 0.3442 0.541 0.3442 0. -0.1148 -0.]

impulse response coefficient using Hamming Window [-0. -0.02266 0. 0.274 0.4973 0.274 0. -0.02266

-0.]

impulse response coefficient using Blackman Window [0. -0.007206 0. 0.2517 0.511 0.2517 0.

-0.007206 0.]


frequency response of Low pass FIR filter with Different Windows
Magnitude (dB)
Normalized Frequency(rad/sample)
Rectangular Window
Hamming Window
Blackman Window
0
−20
−40
−60
−80
−100
−120
−140
0.0
0.2
0.4
0.6
0.8
1.0