Practical 5

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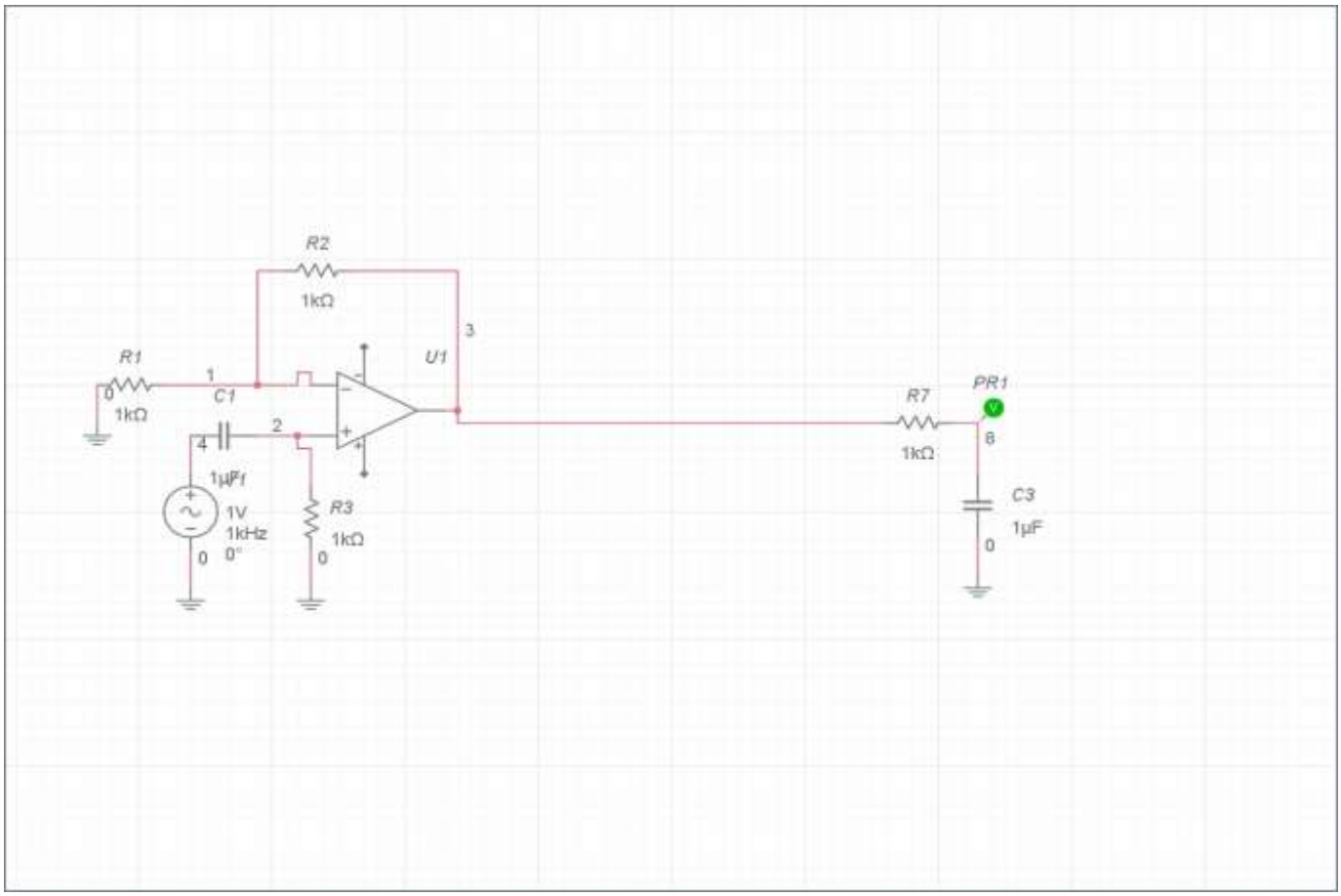
Aim :

To design the active filter (band pass filter and band reject filter)

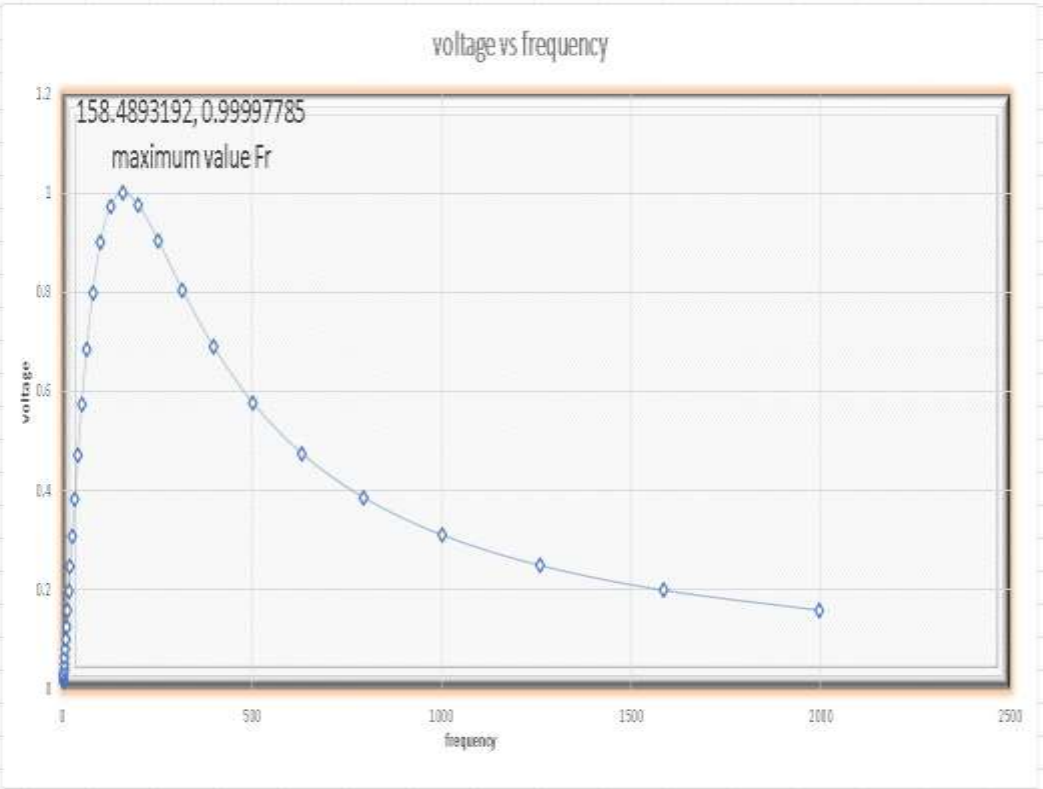
Design and observation and result :

For band pass filter ➔



Excel data observation

100	0.900942447	25.71615
125.8925412	0.973119385	13.31152
158.4893192	0.99997785	0.240064
199.5262315	0.974966768	-12.8439
251.1886432	0.90419935	-25.2828
316.227766	0.803134448	-36.5686
398.1071706	0.689370136	-46.4192
501.1872336	0.576925103	-54.7651
630.9573445	0.474302086	-61.6859
794.3282347	0.385256604	-67.3403
1000	0.310442039	-71.9143
1258.925412	0.248861755	-75.5901
1584.893192	0.198832215	-78.5318
1995.262315	0.158522091	-80.8795
2511.886432	0.12621306	-82.7501
3162.27766	0.100402754	-84.2388
3981.071706	0.079827176	-85.4229
5011.872336	0.063446342	-86.3642
6309.573445	0.050415964	-87.1126
7943.282347	0.040056223	-87.7074
10000	0.031822501	-88.1803
12589.25412	0.025279873	-88.5563
15848.93192	0.020081701	-88.8555
19952.62315	0.015952055	-89.0937
25118.86432	0.012671465	-89.2837
31622.7766	0.01006545	-89.4356
39810.71706	0.007995345	-89.5573
50118.72336	0.006350964	-89.6556



Calculation ➔

<u>For high pass filter</u> **=>**

R = 1kΩ and c = 1µF

F_ch= 1/2*3.14*1000*10^-6=159.235hz

<u>For low pass filter</u> **=>**

R=1kΩ and c =1µF

F_cl = 1/2*3.14*1000*10^-6 = 159.235hz

Now F_max = (F_cl*F_ch) ^½ =159.235hz (theoretical value)

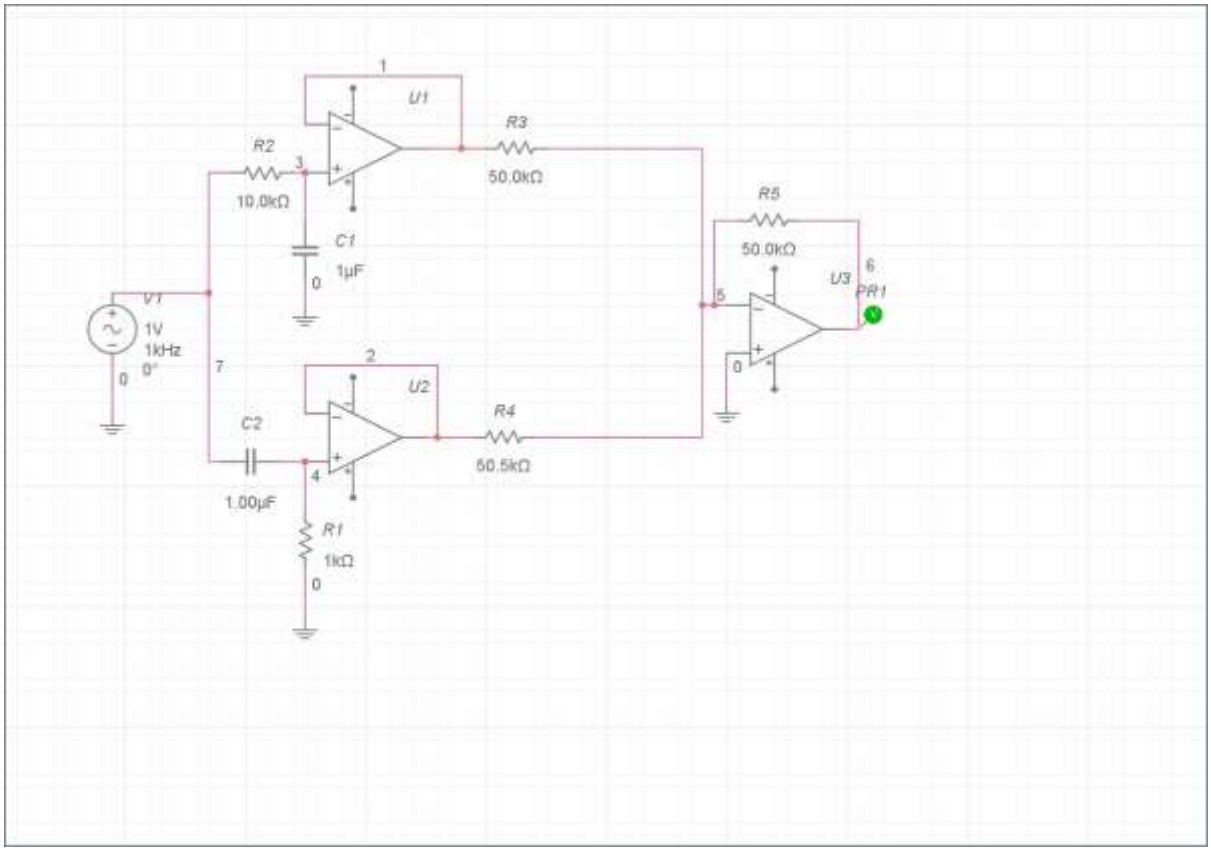
Calculated from graph = 158.489hz

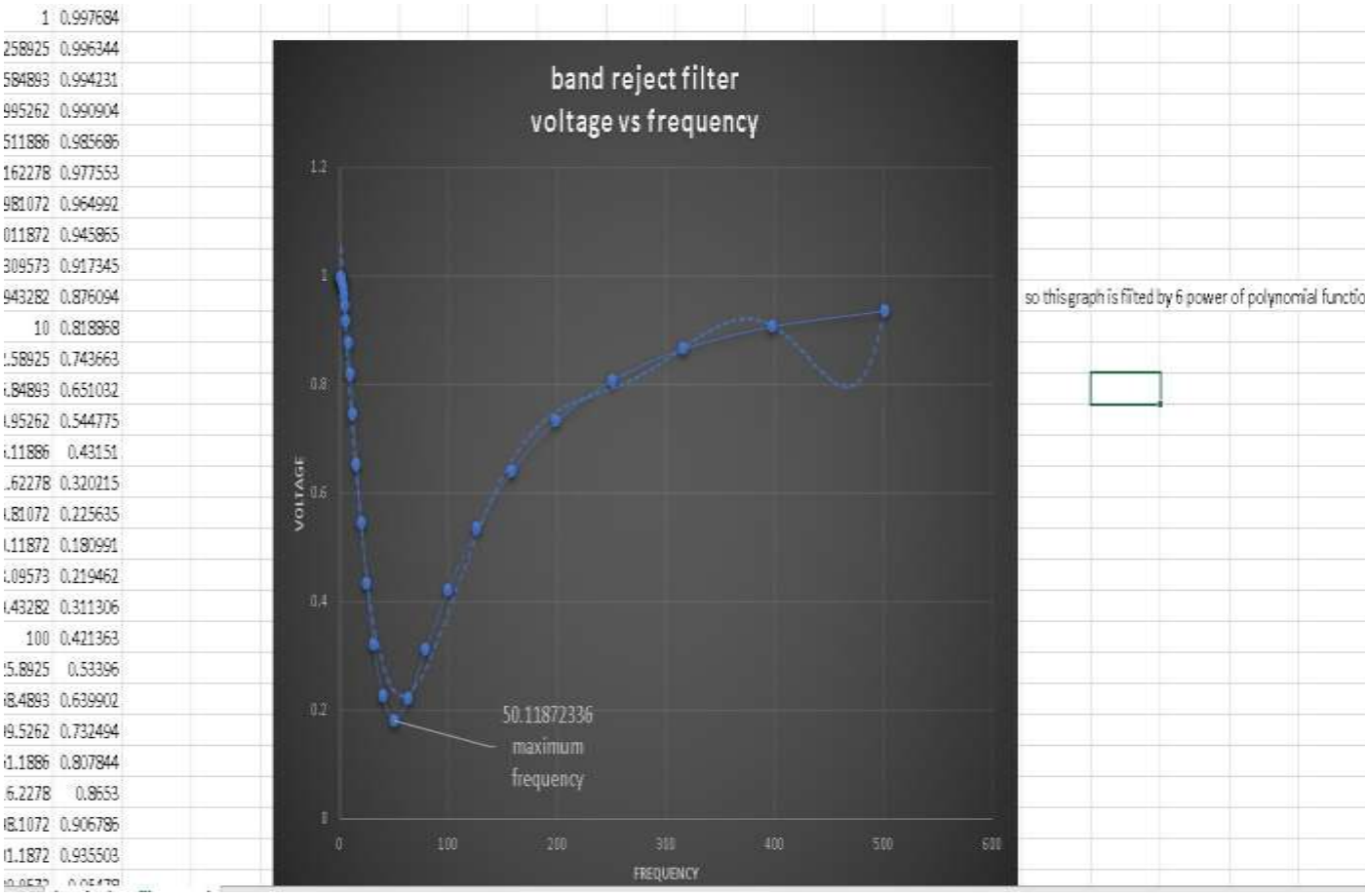
V_max= 999.20 so V_max/ 1.414 = 706.64 corresponding frequency is F2 = 384.41, f1 =65.946

So band width = f2-f1= (384.41-65.946)hz = 318.486hz

Quality factor = f_max/bandwidth = 318.486/158.489=2.00095

For band reject filter➔





Calculation :

For high pass filter **=>**

R = 1kΩ and c = 1µF

F_ch= 1/2*3.14*1000*10^-6 = 159.235hz

For low pass filter **=>**

R=10kΩ and c =1µF

F_cl = 1/2*3.14*1000*10^-6 = 15.9235hz

Now F_max = (F_cl*F_ch) ^½ =50.354hz (theoretical value)

Calculated from graph = 50.118hz

So band width = $f_{ch}-f_{cl}$= (159.235-15.923)hz = 143.312hz

Quality factor = f_{max}/bandwidth = 50.118/143.312=0.3497