DEVICES AND CIRCUITS LAB REPORT – 8

EXPERIMENT NAME: Active Filters.

ROLL NUMBERS:

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Hardware Exercise:

Objectives: To build low pass filter, high pass filter, band stop filter and band pass filter using Op-Amps.

Equipment/Components Required:

1. OP-Amp µA 741
2. Resistors of suitable values
3. Capacitors of suitable values
4. Regulated power supply
5. Arbitrary Function Generator
6. Digital Storage Oscilloscope

Observations:

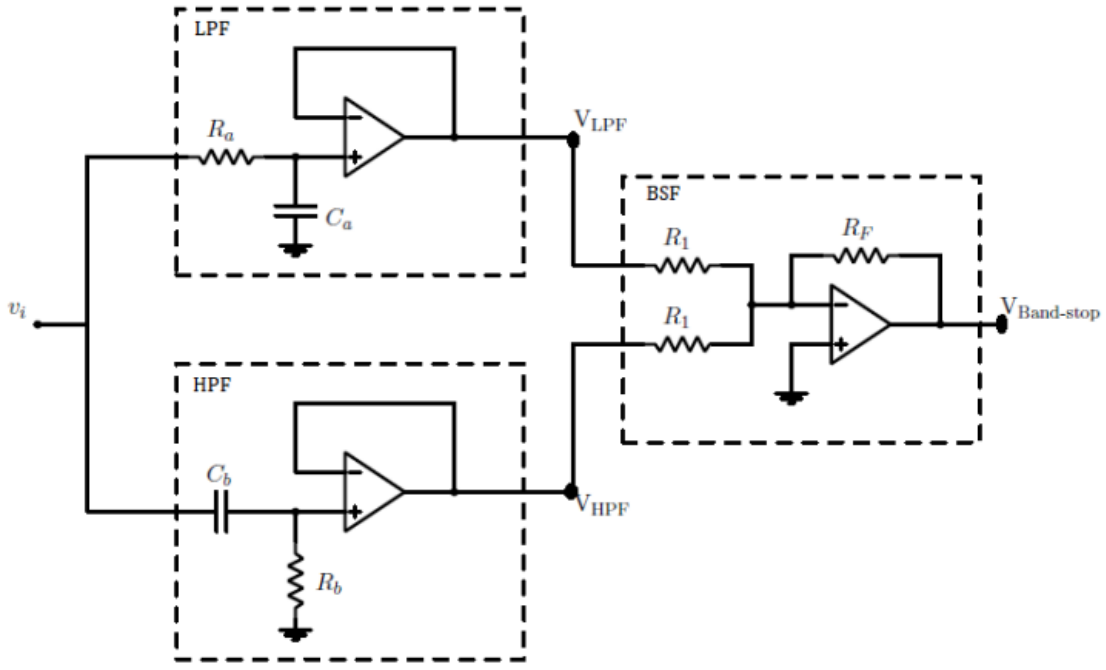


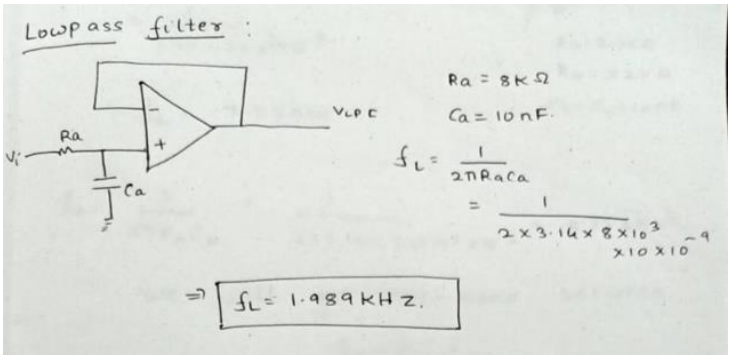
Figure 1: Circuit for Active Filters

1. Low Pass Filter:

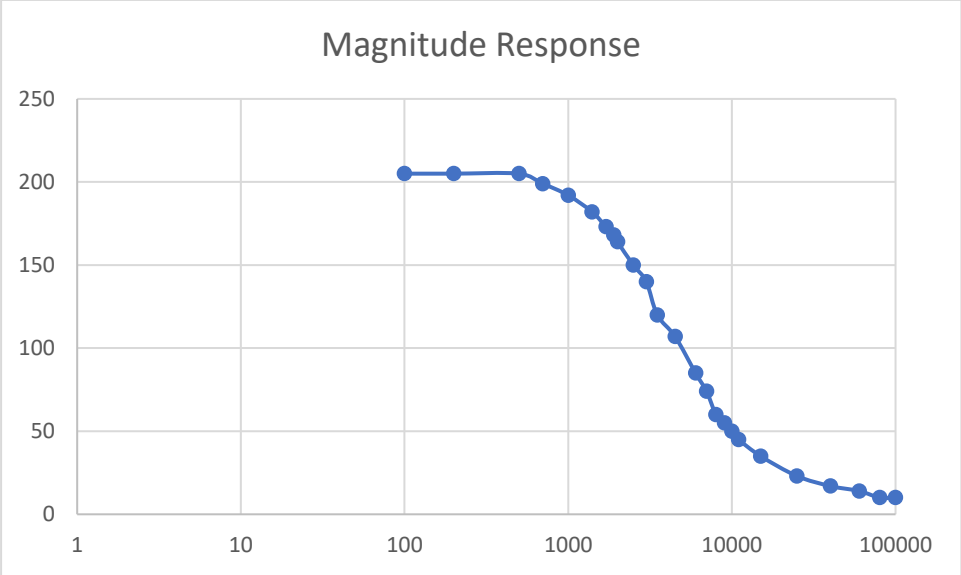
Cut off Frequency: 1.984 kHz

When we give a sinusoidal input having amplitude 100 mV, vary the frequency from 100 Hz to 100 kHz and observe the output we got the following values.

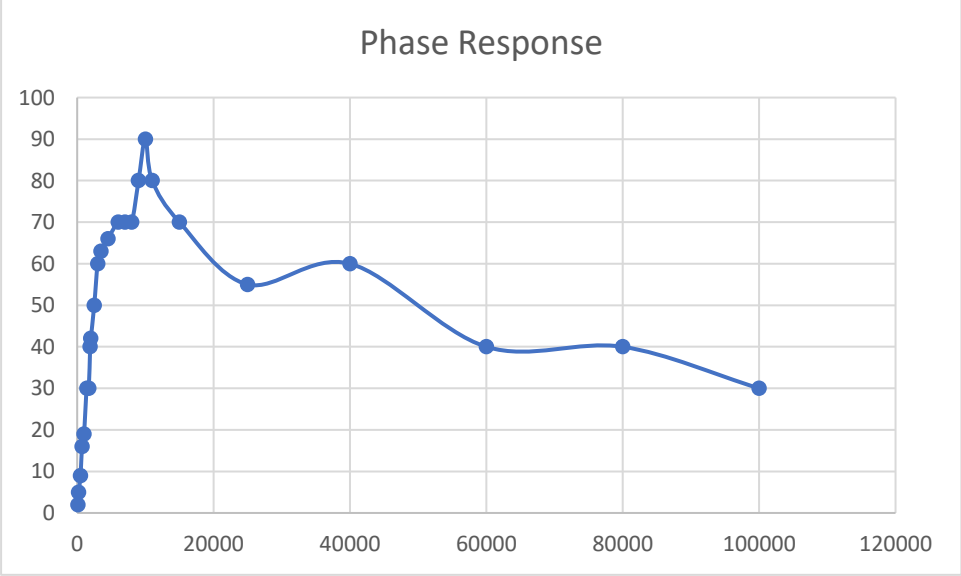
Frequency (in Hz)	Vin (in mVp-p)	Vo (in mVp-p)	Phase (degree)
100	200	205	2
200	200	205	5
500	200	205	9
700	200	199	16
1000	200	192	19
1400	200	182	30
1700	200	173	30
1900	200	168	40
2000	200	164	42
2500	200	150	50
3000	200	140	60
3500	200	120	70
4500	200	107	60
6000	200	85	60
7000	200	74	70
8000	200	60	70
9000	200	55	80
10000	200	50	100
11000	200	45	80
15000	200	35	70
25000	200	23	55
40000	200	17	60
60000	200	14	40
80000	200	10	40
100000	200	10	30



Magnitude response: Graph was done w.r.t log scale , i.e Y-axes is logarithmic



Phase Response:

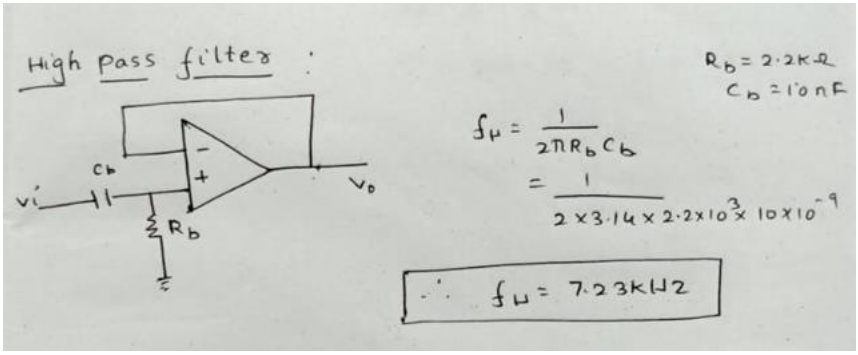


2. High Pass Filter:

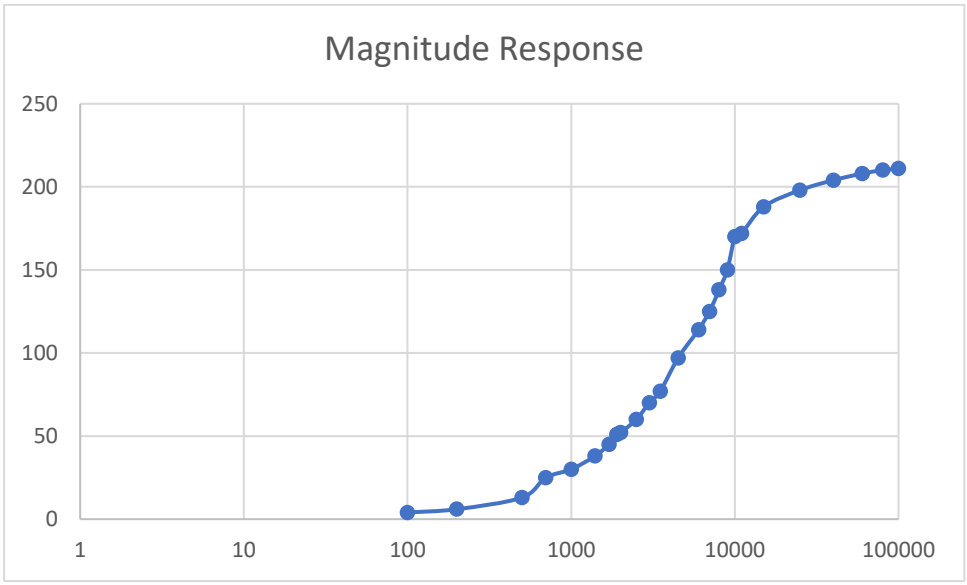
Cut off Frequency: 7.234kHz

When we give a sinusoidal input having amplitude 100 mV, vary the frequency from 100 Hz to 100 kHz and observe the output we got the following values.

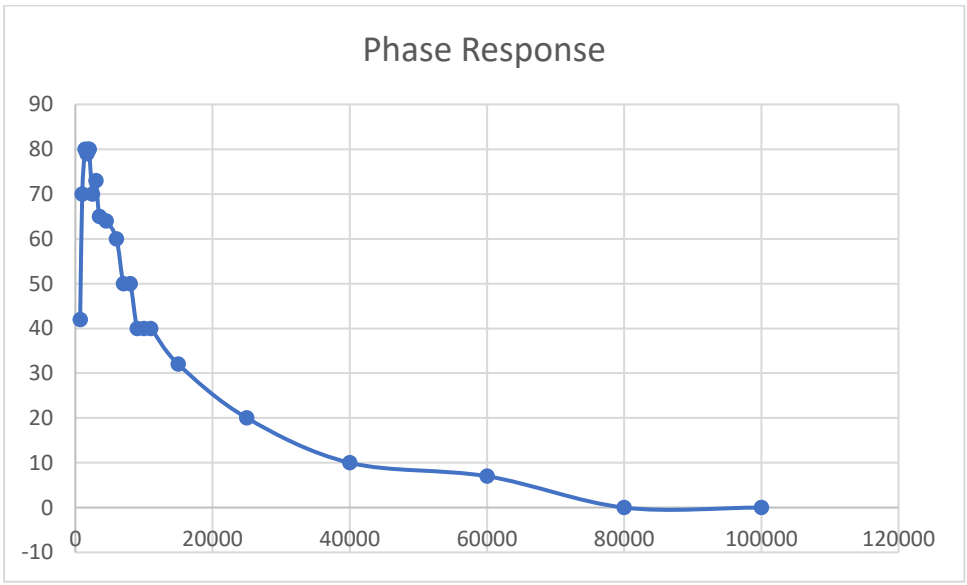
Frequency	Vin	Vo	phase
100	200	4	
200	200	6	
500	200	13	
700	200	25	42
1000	200	30	70
1400	200	38	80
1700	200	45	79
1900	200	51	80
2000	200	52	80
2500	200	60	70
3000	200	70	73
3500	200	77	65
4500	200	97	64
6000	200	114	60
7000	200	125	50
8000	200	138	50
9000	200	150	40
10000	200	170	40
11000	200	172	40
15000	200	188	32
25000	200	198	20
40000	200	204	10
60000	200	208	7
80000	200	210	0
100000	200	211	0



Magnitude response: Graph was done w.r.t log scale , i.e Y-axes is logarithmic



Phase Response:

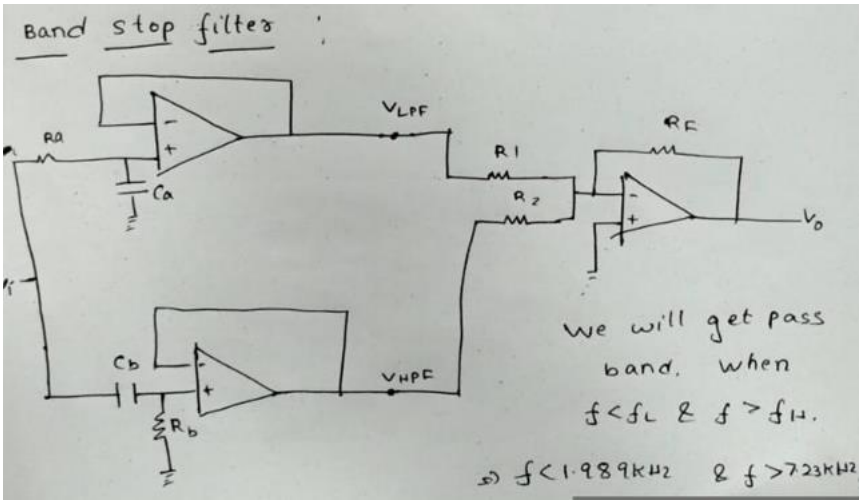


3. Band Stop Filter:

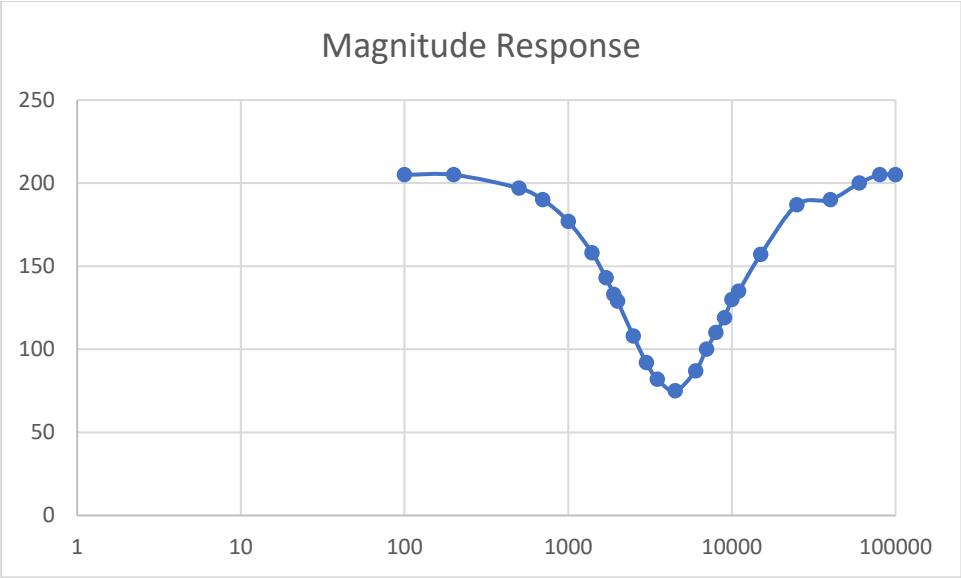
Lower Cut off Frequency: 1.984kHz
Higher Cut off Frequency: 7.234kHz

When we give a sinusoidal input having amplitude 100 mV, vary the frequency from 100 Hz to 100 kHz and observe the output we got the following values.

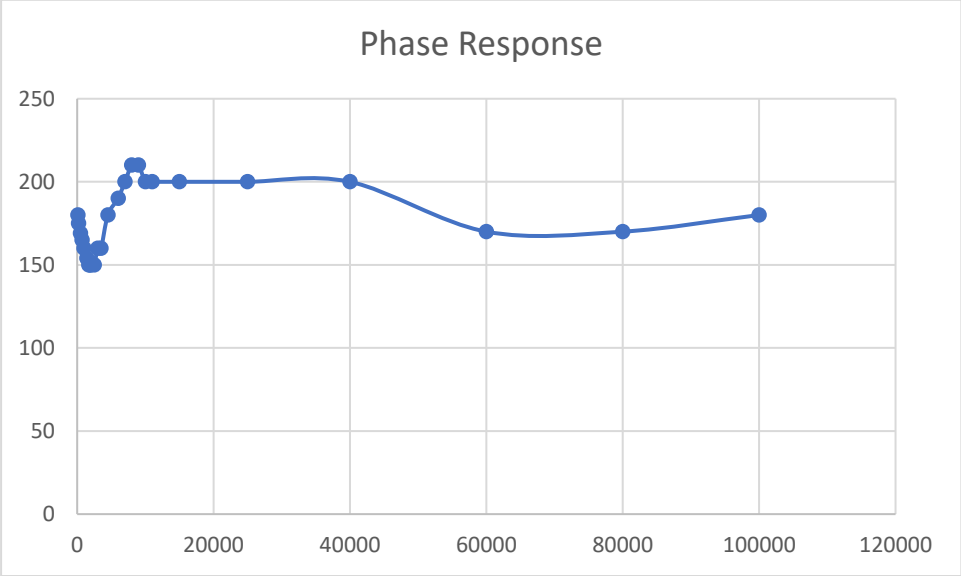
Frequency	Vin	Vo	phase
100	200	205	180
200	200	205	175
500	200	197	169
700	200	190	165
1000	200	177	160
1400	200	158	154
1700	200	143	150
1900	200	133	150
2000	200	129	150
2500	200	108	150
3000	200	92	160
3500	200	82	160
4500	200	75	180
6000	200	87	190
7000	200	100	200
8000	200	110	210
9000	200	119	210
10000	200	130	200
11000	200	135	210
15000	200	157	160
25000	200	187	200
40000	200	190	200
60000	200	200	170
80000	200	205	170
100000	200	205	180



Magnitude response : Graph was done w.r.t log scale , i.e Y-axes is logarithmic



Phase Response:



4. Band Pass Filter:

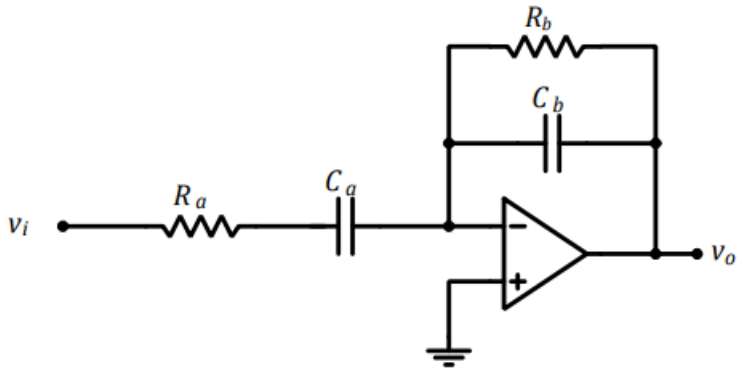


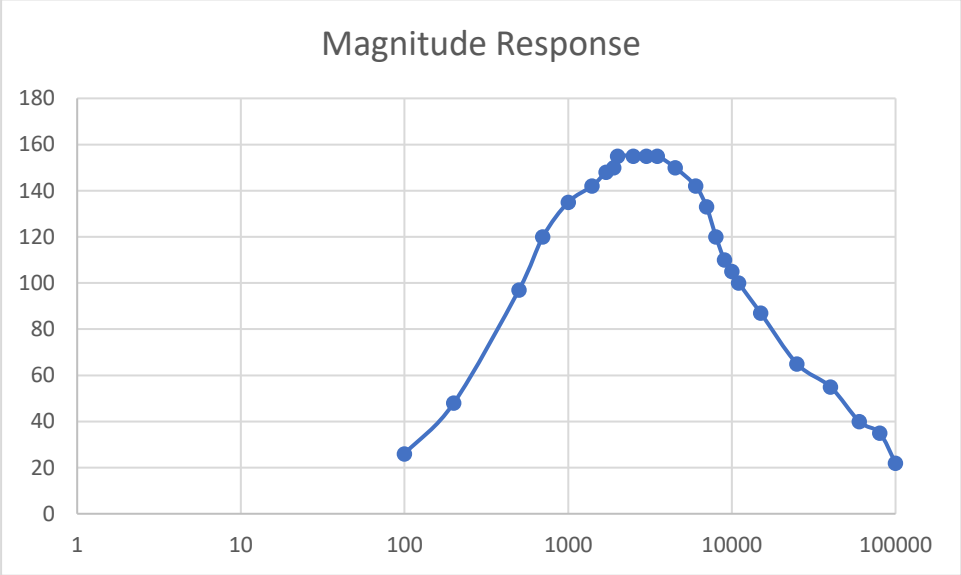
Figure 2: Circuit for a band-pass active filter.

Lower Cut off Frequency: 723.79kHz
Higher Cut off Frequency: 7237.9kHz

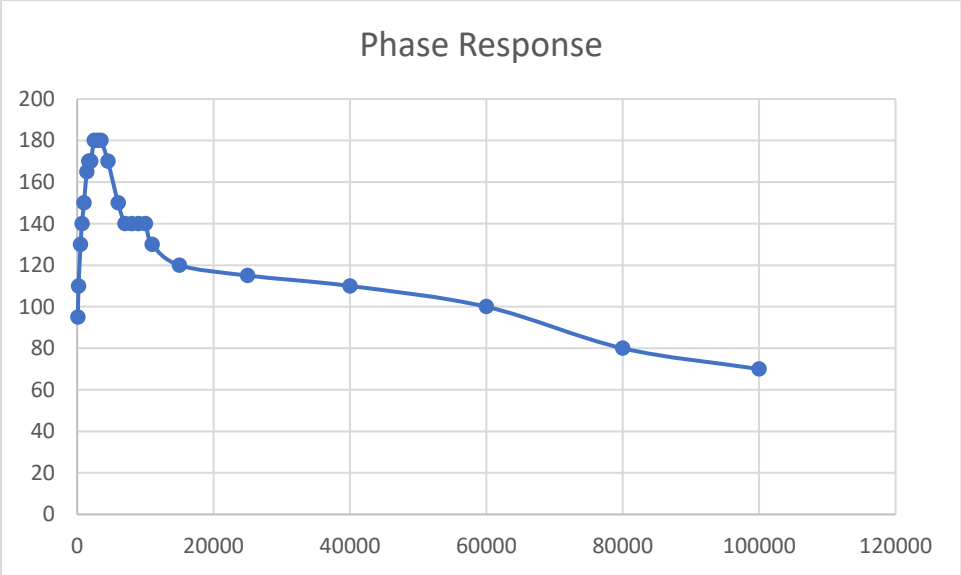
When we give a sinusoidal input having amplitude 100 mV, vary the frequency from 100 Hz to 100 kHz and observe the output we got the following values.

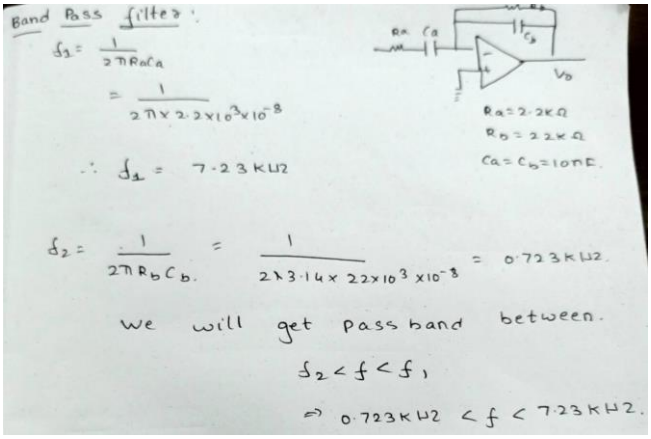
Frequency	Vin	Vo	phase
100	200	26	95
200	200	48	110
500	200	97	130
700	200	120	140
1000	200	135	150
1400	200	142	165
1700	200	148	170
1900	200	150	170
2000	200	155	170
2500	200	155	180
3000	200	155	180
3500	200	155	180
4500	200	150	170
6000	200	142	150
7000	200	133	140
8000	200	120	140
9000	200	110	140
10000	200	105	140
11000	200	100	130
15000	200	87	120
25000	200	65	115
40000	200	55	110
60000	200	40	100
80000	200	35	80
100000	200	22	70

Magnitude response : Graph was done w.r.t log scale , i.e Y-axes is logarithmic



Phase Response:





Discussion:

200020051:

In lab 8 we learnt the characteristics of low-pass, high pass, band pass and band stop active filters.we used DSO and AFG to measure the output and generate the input.

In this lab we did all well and nothing went wrong

200020010:

Today in lab 8 we understood the exact characteristics of low-pass, high pass, band pass and band stop active filters. We saw that the filters wont provide the exact ideal filter characteristics due to opamp non linearity.