Experiment no. 8

AIM: To design, construct and plot the frequency response of second order High pass filter having the f_c of 1 kHz.

APPARATUS REQUIRED:

S.No.	Name of the Apparatus	Range/Value	Qty
1.	Bread Board	-	1
2.	IC Power Supply	±15 V	1
3.	Resistor	10 k Ω, 5.86 k Ω 1.6 k Ω	1 2
4.	IC 741 Op-Amp	-	1
5.	CRO	20 MHz.	1
6.	Function Generator	0-3MHz.	1
7.	Capacitor	0.1μF	2
8.	Connecting Wires	-	Few

THEORY:

An improved filter response can be obtained by using a second order active filter. A second order filter consist of two RC pairs has a roll-off rate of –40db/decade. The transfer function of a Low pass filter is $H(s)$. For n=2, the damping factor α = 1.414, the pass band gain $A0 = 3 - \alpha = 1.586$. Cutoff frequency of the filter = $1/ 2\pi RC = \square h$. HPF is the complement of the Low pass filter and can be obtained simply by interchanging R and C in the low pass configuration

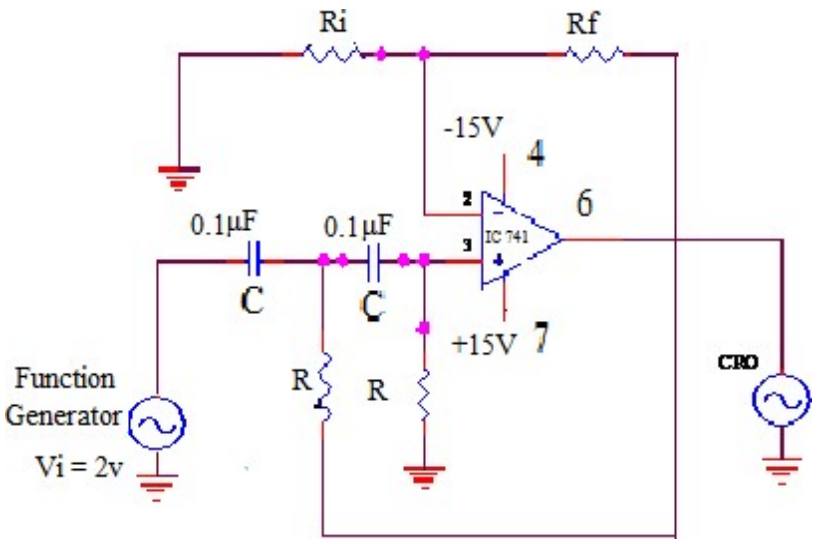
DESIGN:

f_c = 1KHz, Assume C = 0.1μF, $R = 1/2\pi fcC =$

The gain for the second order filter is known as 1.5816.

Let R_i = 10KΩ, Gain =Ao = 1.5816 => $1+ R_f / R_i = 1.586$ => $R_f = 0.586$ **Ri =**

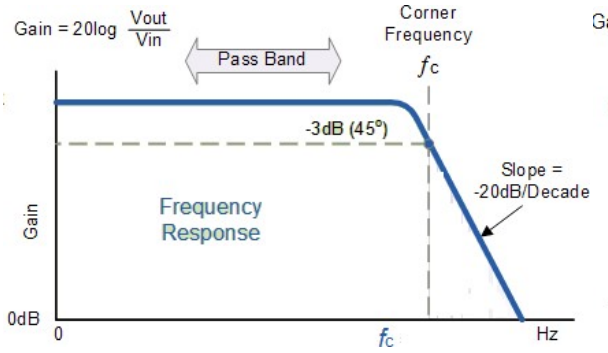
Second order High Pass Filter:



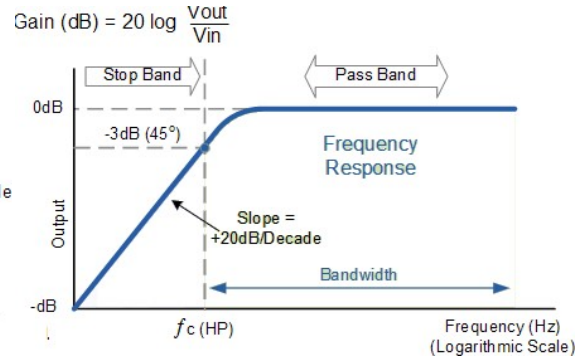
High Pass Filter: **INPUT VOLTAGE: Vi =** volts

Frequency Hz	Output voltage Vo volts	Gain in db 20 logVo/Vi

MODEL GRAPH:



Low Pass Filter:



High Pass Filter:

RESULT:

Thus the Second order low pass filter and High pass filter was designed and frequency response plot wasdrawn.

LPF: i. Theoretical = ii. Practical =

HPF: i. Theoretical = ii. Practical =