Experiment no. 7

AIM: To design, construct and plot the frequency response of second order low pass 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:

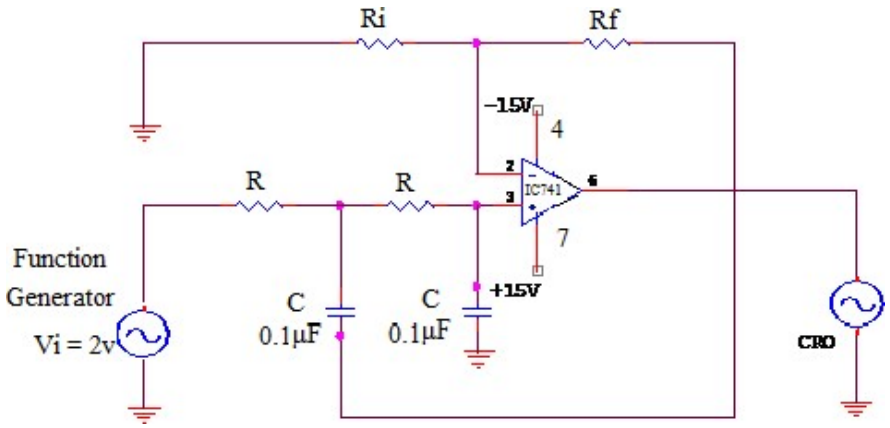
f_c = 1KHz, Assume C = 0.1μF, R= $1/2\pi fcC$=

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

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

CIRCUIT DIAGRAM:

Low Pass Filter



PROCEDURE:

1. Connect the Low pass filter circuit as shown in the circuit diagram.
2. Give an input signal Vi of 2V(p-p) and measure the output voltage for different frequency from theCRO.
3. Plot the frequency response 20 log V_o/V_i versus input frequency and find 3db frequency.
4. Determine the cut-off frequency from the plot.

TABULATION:

Low Pass Filter **INPUT VOLTAGE: V_i =** volts

Frequency Hz	Output voltage Vo volts	Gain in db 20 logV_o/V_i

Result -