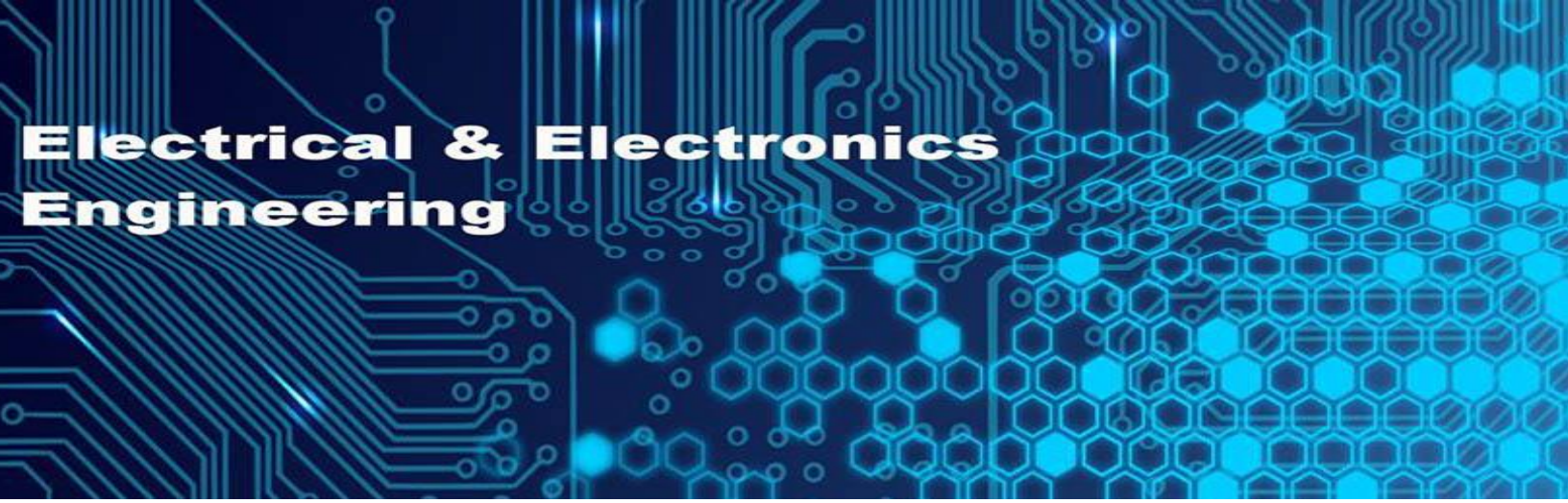

EEE Lab Report

Course: Electronic Devices and Circuits & Pulse Techniques Lab
Course Code: EEE 204

Experiment No: 05
Experiment Name: Summing Amplifier
Date of Performance: 01/04/2021
Date of Submission: 09/04/2021

Submitted By:	Submitted To:
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Signature and Date
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Lecturer
Department of EEE
Green University of Bangladesh

Experiment No: 05

Experiment Name: Summing Amplifier

Aim: To design and setup a summing amplifier circuit with OP AMP 741C for a gain of 2 and verify the output.

Objectives: After completion of this experiment, we will be able to gain and setup a summing amplifier using OP AMP.

Equipments/Components:

SL. No.	Name and Specification	Quantity required
01.	Dual power supply +/-15V	1
02.	DC power source 1.5V	2
03.	Function generator (0-1MHz)	1
04.	Oscilloscope	1
05.	Bread board	1
06.	IC 741C	1
07.	Resistor	3
08.	Probes and connecting wires	As required

Principle: Op-amp can be used to design a circuit whose output is the sum of several input signals. Such a circuit is called a summing amplifier or an adder. Summing amplifier can be classified as inverting & non-inverting summer depending on the input applied

to inverting & non-inverting terminals respectively. Circuit Diagram shows an inverting summing amplifier with 2 inputs. Here the output will be amplified version of the sum of the two input voltages with 180° phase reversal.

$$V_o = -\left(\frac{R_f}{R_i}\right)(V_1 + V_2)$$

Procedure:

01. Check the components.
02. Setup the circuit on the breadboard and check the connections.
03. Switch on the power supply.
04. Give $V_1 = V_2 = +1.5\,V$ DC with polarity as shown in figure-5.1
05. Make sure that the CRO selector is in the D.C. coupling position.

06. Observe input and output on two channels of the oscilloscope simultaneously.

07. Note down and draw the input and output waveforms on the graph.

08. Verify that the output voltage is -6VDC.

09. Repeat the procedure with $V_1 = 1V_{PP}/1KHz$ sine wave and $V_2 = +1.5Vdc$ as shown in figure - 5.2

10. Verify the output.

Circuit Diagram:

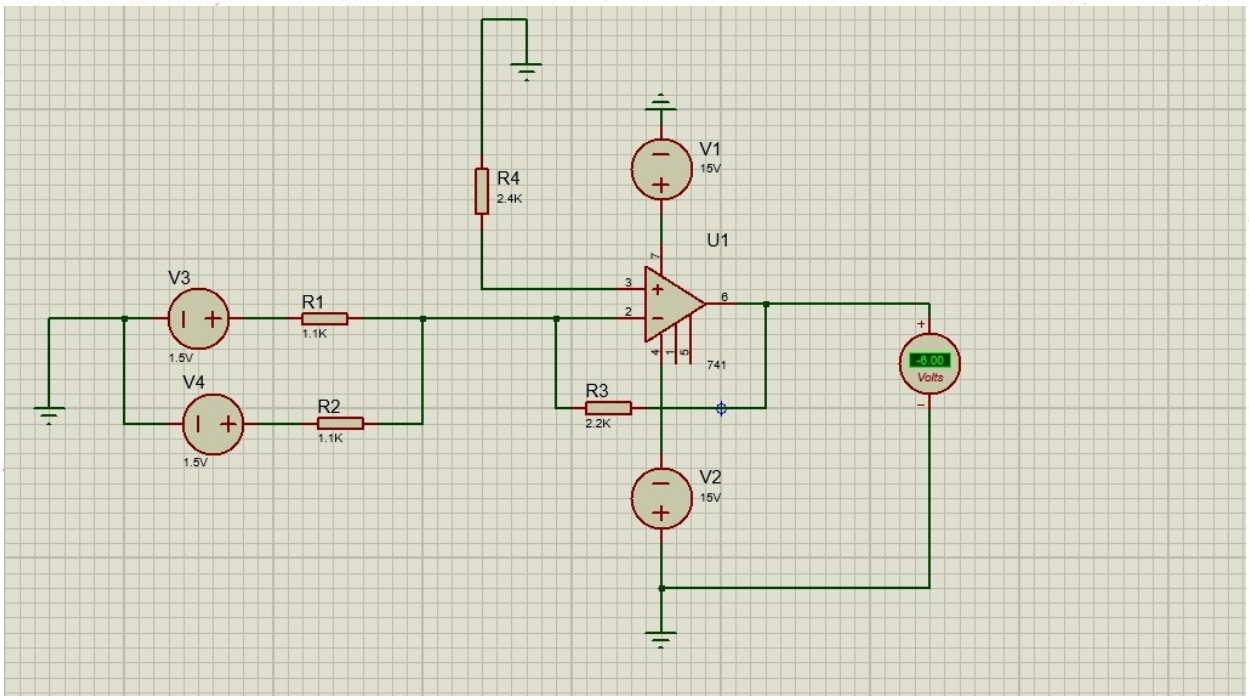


Figure-5.1(Proteus)

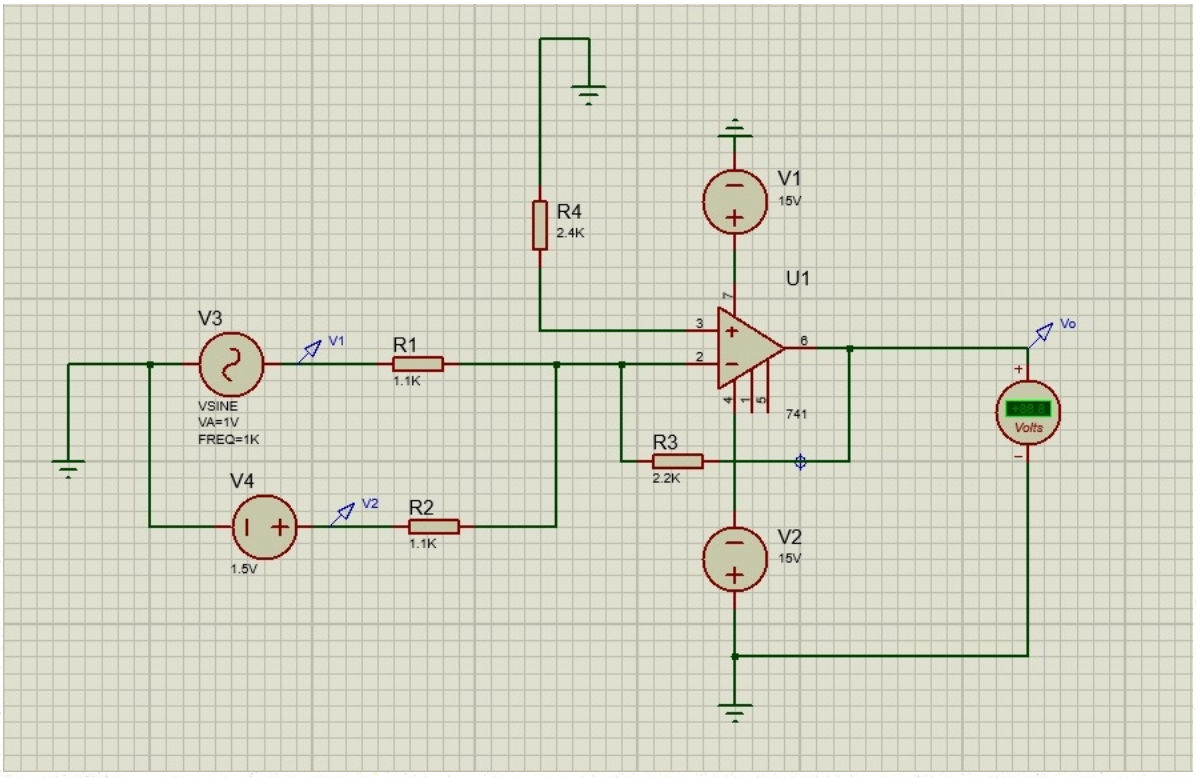


Figure:5.2(Proteus)

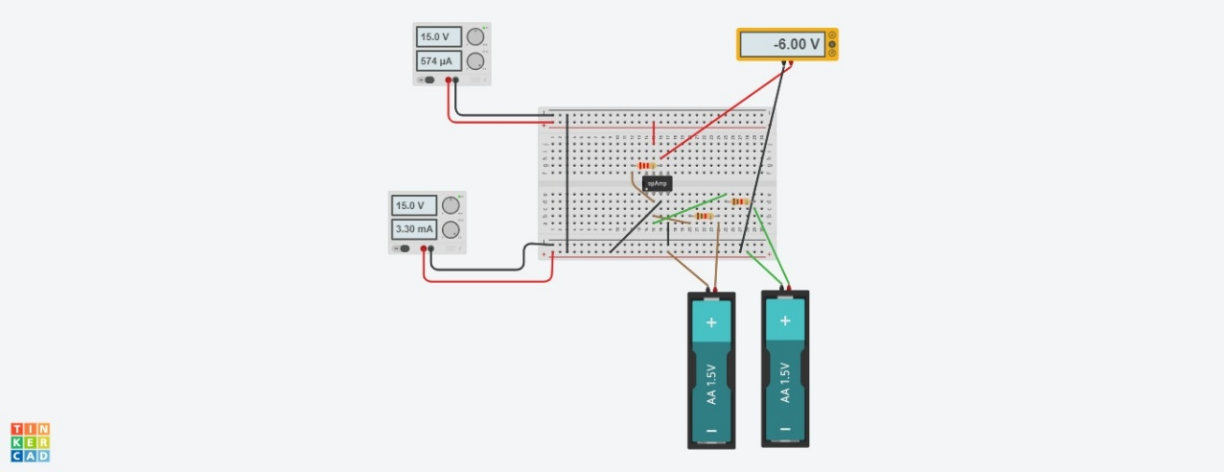


Figure: 5.3(TinkerCAD)

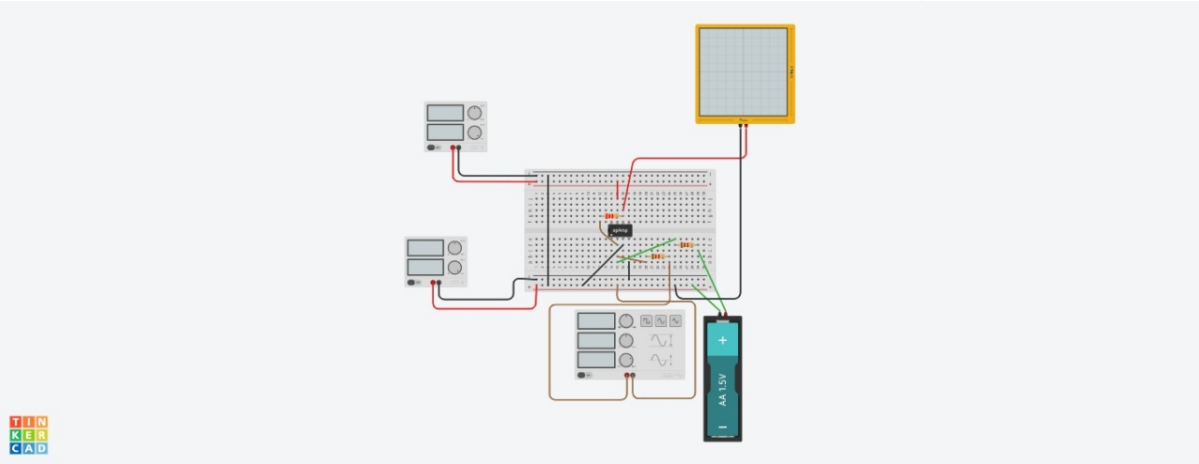
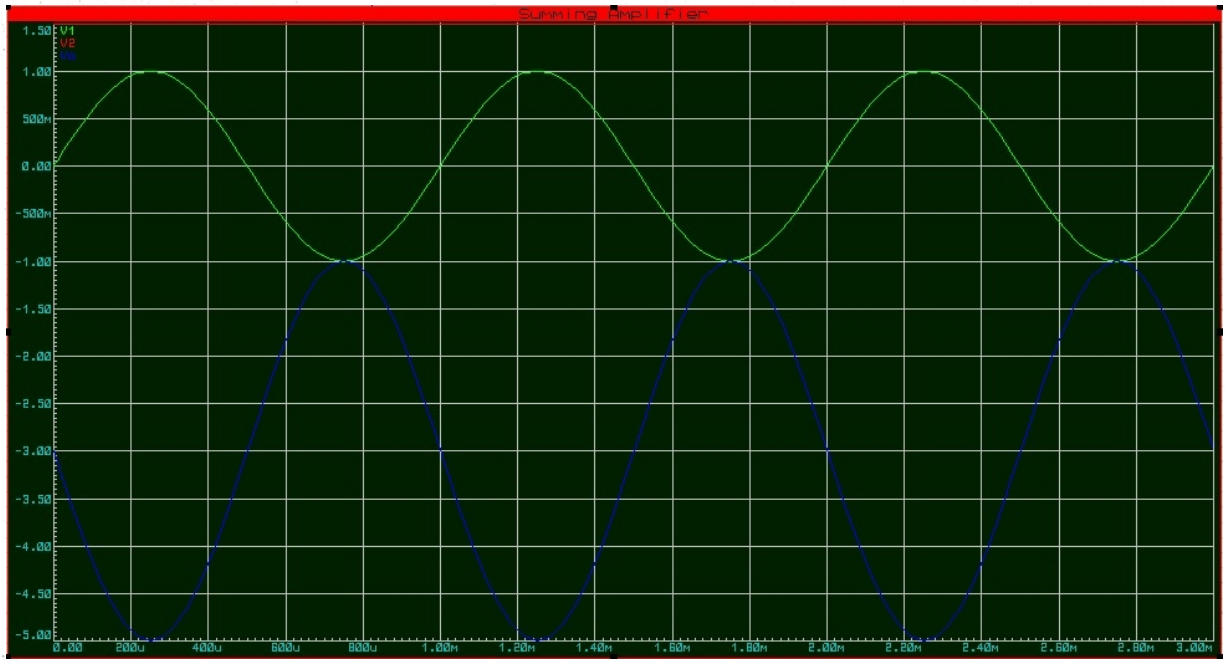


Figure: 5.4(TinkerCAD)

Graph:



Graph: Summing Amplifier

Result:

We know that,

The output voltage of an inverting summing amplifier is given by

$$V_0 = -\frac{R_f}{R_i}\left(V_1 + V_2\right).$$

Let,

$R_f = 2.2\,k\Omega$ and $R_i = 1.1\,k\Omega$

Then $V_0 = -\frac{2.2}{1.1}\left(V_1 + V_2\right)$

$$= -2(V_1 + V_2)$$

Part-1:

Let,

$V_1 = 1.5\ DC$

and $V_2 = 1.5\ DC$

$\therefore V_o = -2(1.5 + 1.5)$

$= -2(3)$

$= -6$

Again,

Part-2:

Let,

$V_1 = 1\ V_{pp}$ Sine wave

and $V_2 = 1.5\ DC$

Then $V_o = -2(V_1 + 1.5)$

$= -2V_1 - 3$

$\therefore$ If $V_1 = 1V_{pp}$ then $V_o = -2(1V_{pp} + 1.5)$

or, -2 V_{PP} -3 [2 sine wave will be visible in this case]

Discussion: The summing amplifier is another type of operational amplifier circuit configuration that is used to combine the voltages present on two or more inputs into a single output voltage.

From this experiment, we can design an op amp circuit which can combine number of input signals and can produce single output as a weighted sum of input signals. By this experiment, we learned that summing amplifier is basically an op amp circuit is a adder based circuit which produces an

output equal to the sum of the input voltages applied as its inverting terminal.

Finally - we can say that, this experiment is more effective to gain knowledge about a summing amplifier and from this experiment - we can realize that, how summing amplifier - works. So at last - we can say that, this experiment is more important for us.

References:

[1] Lab Manual for EEE 204 Course [Made & Edited by Mr. Md. Sharif Nafis Mahmood, Lecturer, Dept. of EEE, Green University of Bangladesh]

[2] Electrical devices and circuit theory by Robert L. boylestad and L. nashelsky (7th Edition) [Page no: 167-170]

[3] https://www.electrical4u.com/summing-amplifier/