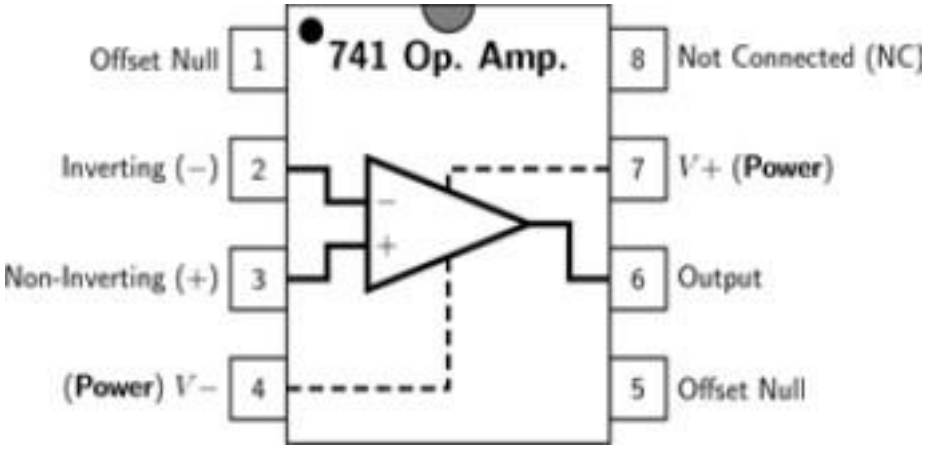
(Lab-8 : Design and analysis of Op-Amp based Inverting amplifier, Non-inverting amplifier, summer and difference amplifier circuits)

8a) Aim: To design and study the characteristics of Inverting Amplifier.

Software: Multisim 14 or above (online link: https://www.multisim.com/ after free signup)

Pin Diagram of uA 741



Procedure:

1. Open the workspace in Multisim
2. Drag and drop Op-Amp (UA741 IC)
3. Drag more components and design the circuit shown below
4. Connect them using wire tool
5. Use appropriate voltage source
6. Connect the voltage/current probes and take screenshots of the wave shapes(input and output)

CIRCUIT DIAGRAM:

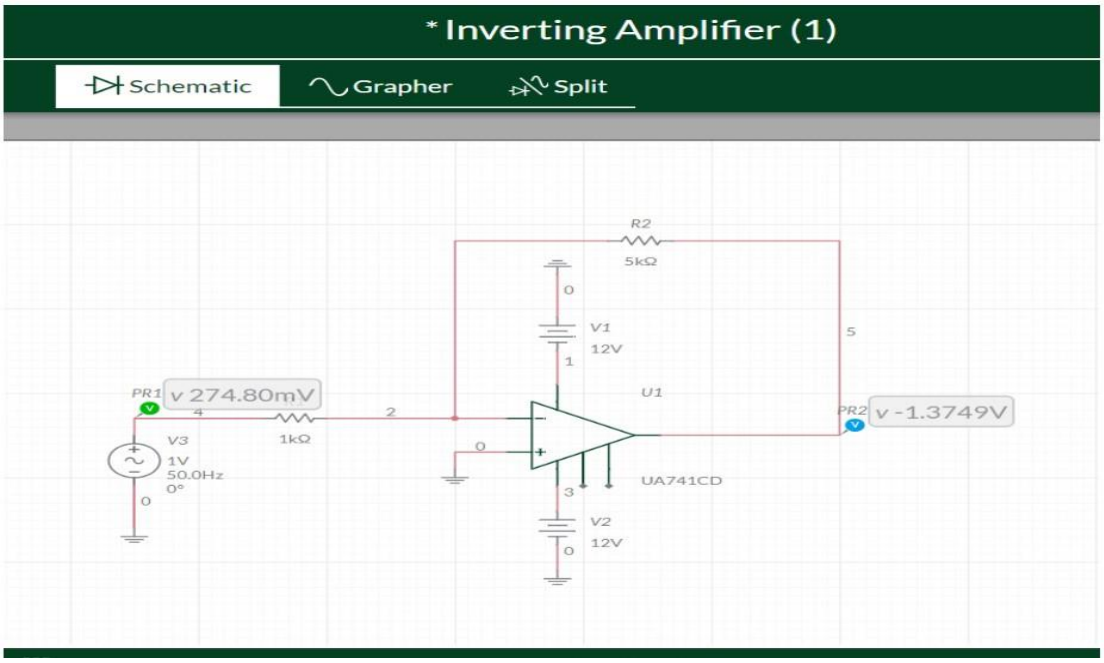
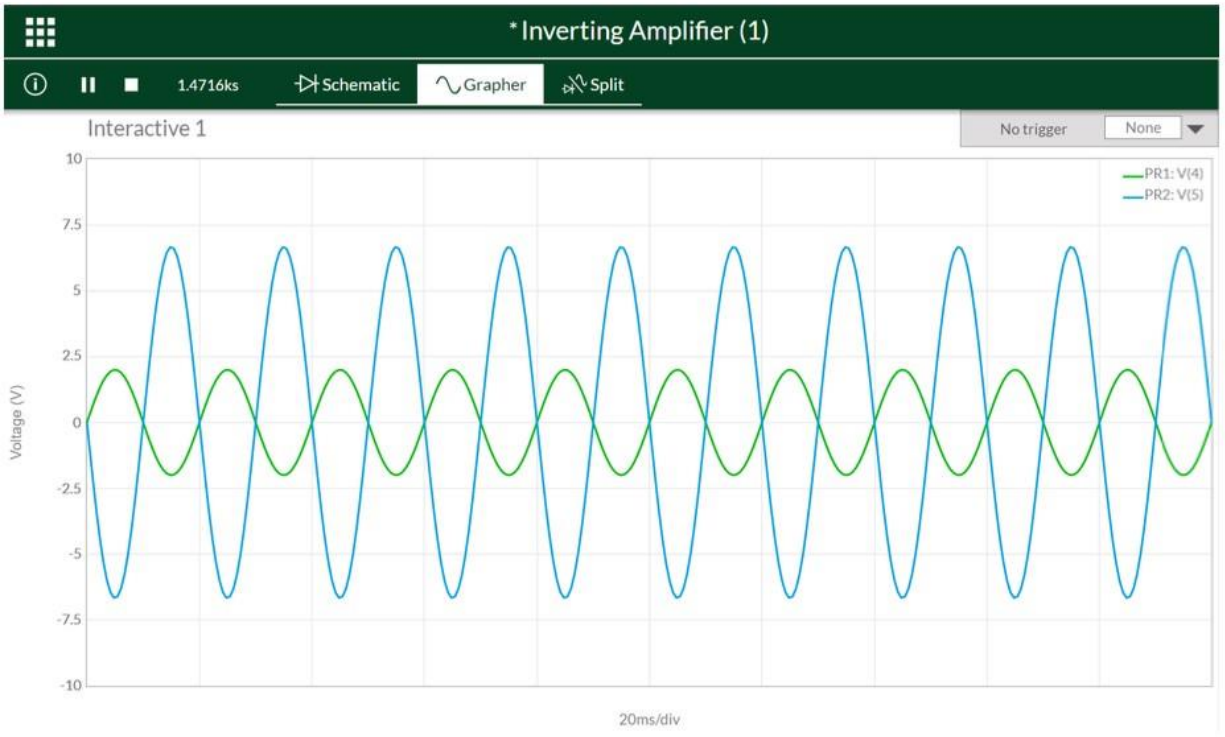


Fig. 1.1 INVERTING AMPLIFIER

OUTPUT Waveforms:



RESULT: Verify that as the circuit is inverting Configuration, so the O/P is 180˚ out of phase with I/P.

Vout= -R2/R1*Vin

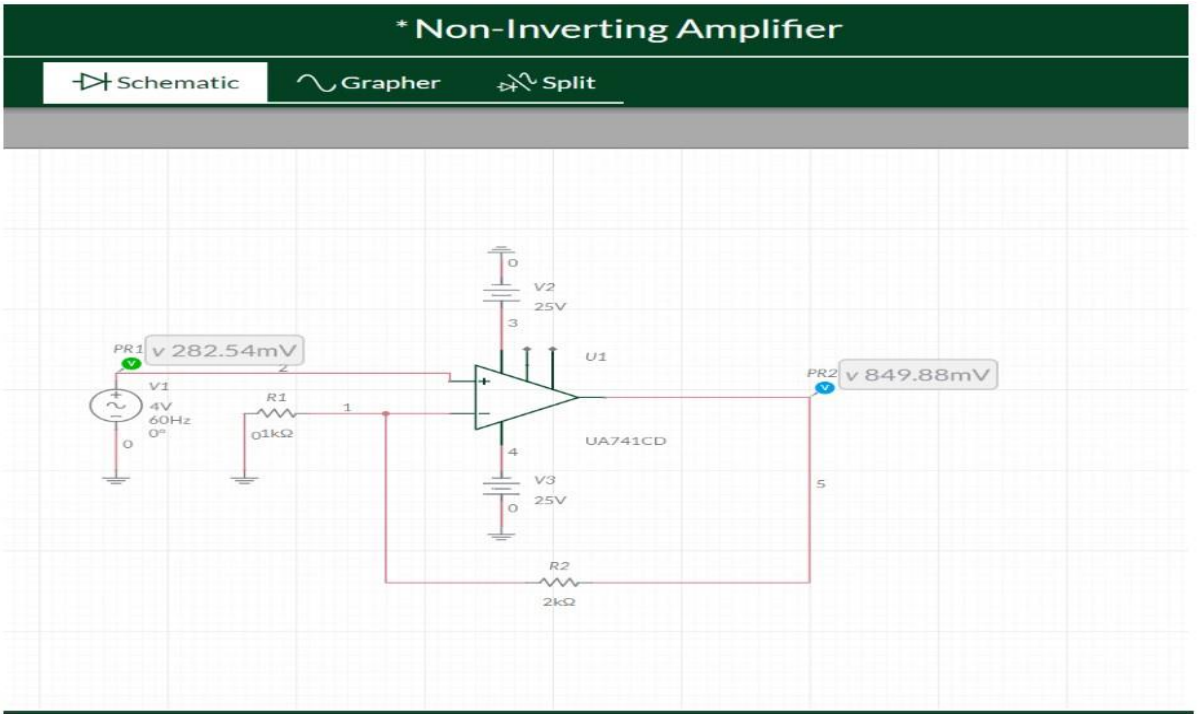
EXPERIMENT NO: 8(ii)

AIM: Design and study of characteristics of Non-Inverting Amplifier.

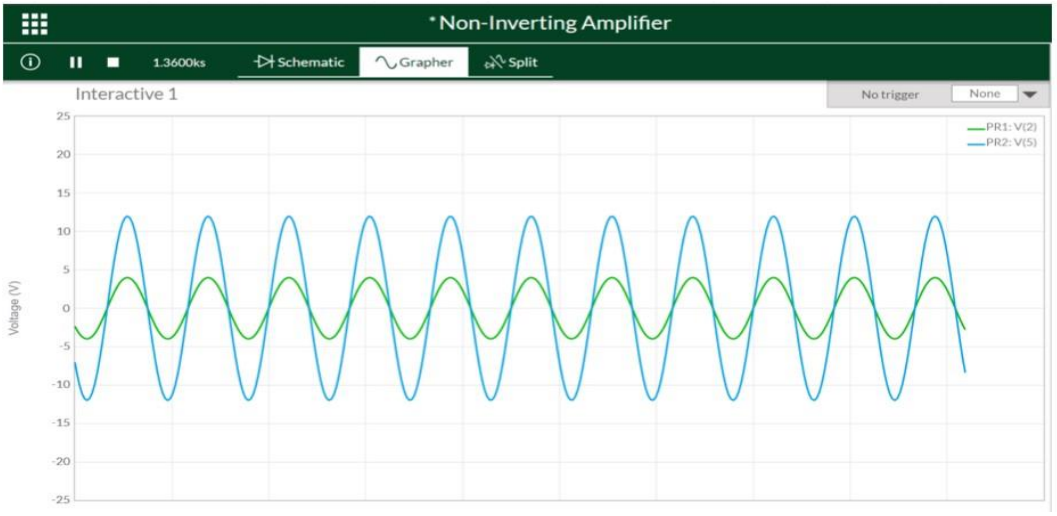
Procedure:

1. Open the workspace in Multisim
2. Drag and drop Op-Amp (UA741)
3. Drag more components and design the circuit shown below

CIRCUIT DIAGRAM



Output waveforms:



RESULT: The O/P = I/P (1+ ratio of feedback R to input). As we increase the value of R3, the magnitude of O/P voltage decreases.

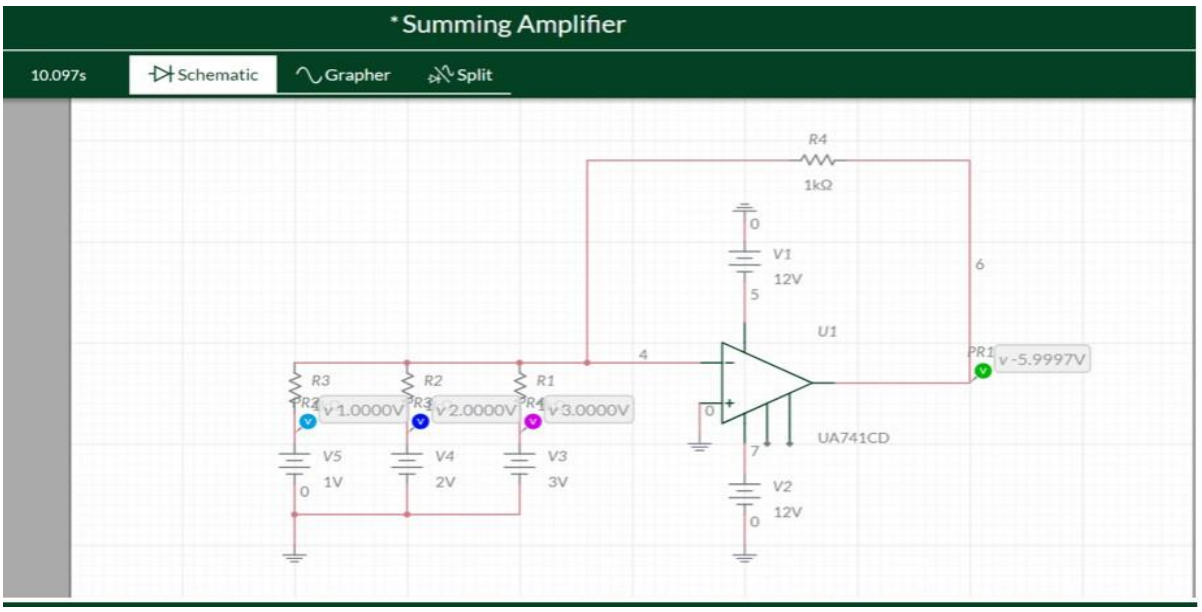
EXPERIMENT NO: 8(iii)

AIM: Design & draw the resulting waveform of Summing Amplifier.

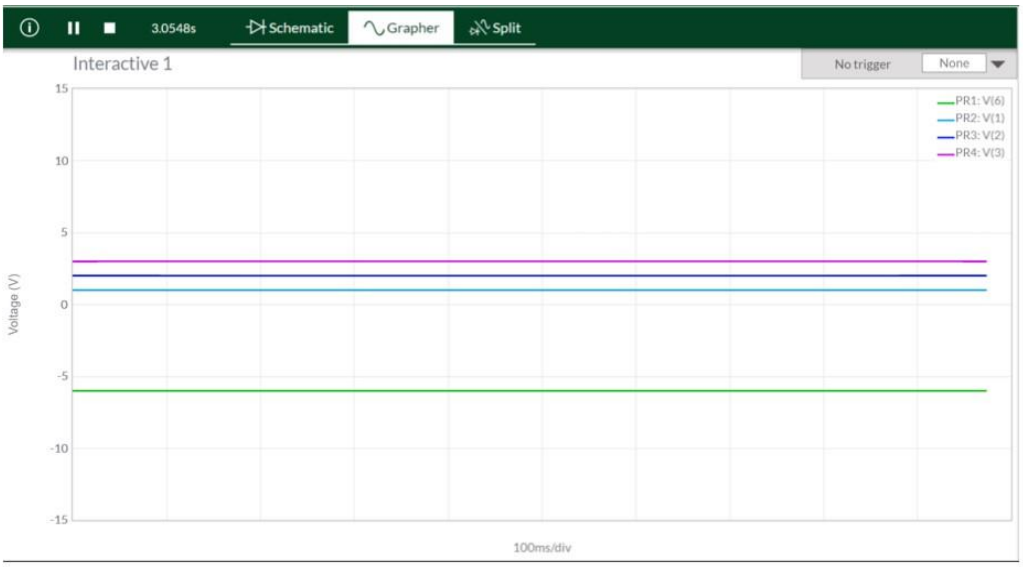
Procedure:

1. Open the workspace in Multisim
2. Drag and drop Op-Amp (UA741)
3. Drag more components and design the circuit shown below

CIRCUIT DIAGRAM:

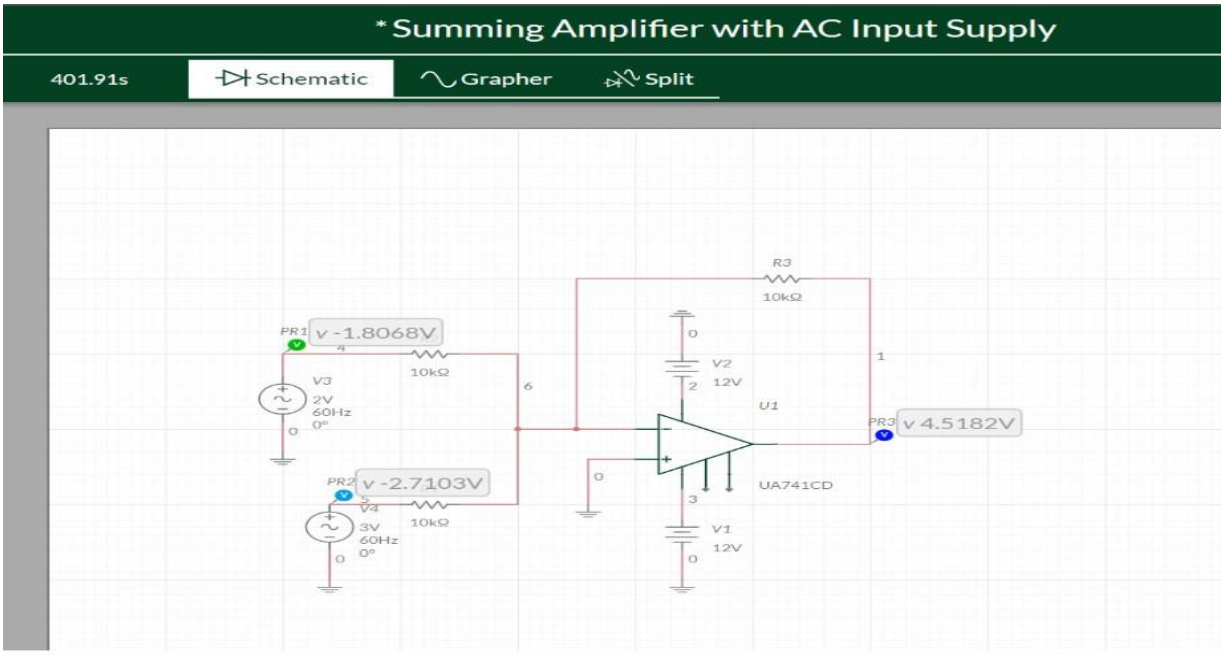


OUTPUT:

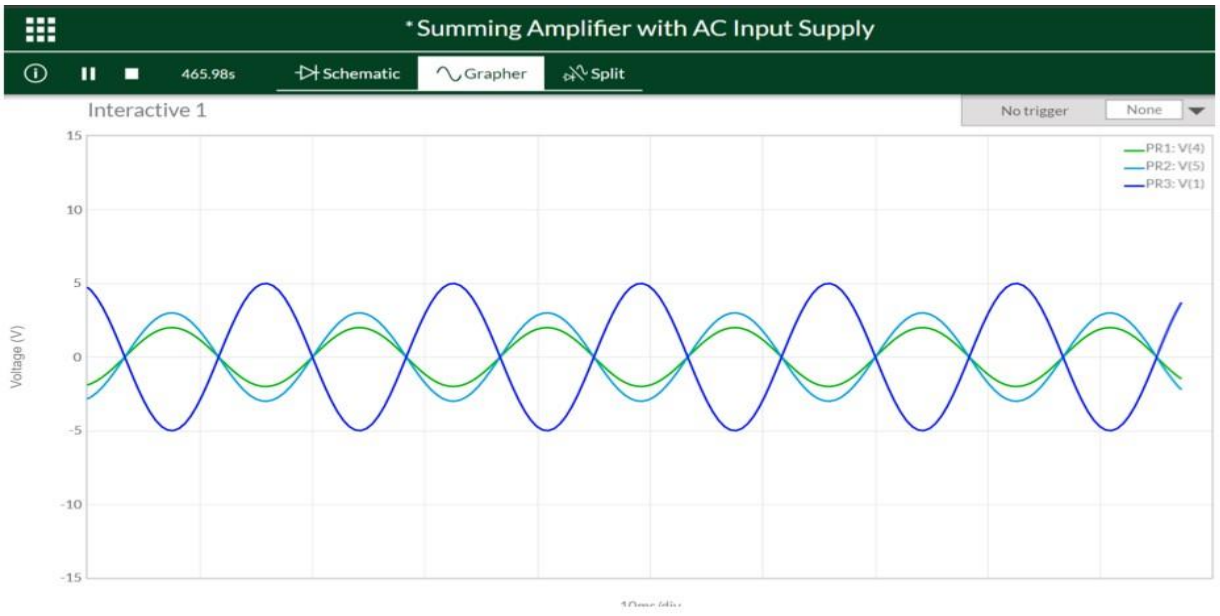


RESULT: Increasing the I/P voltage increase the O/P voltage. Decrease the I/P resistance increases O/P voltage. Increasing the feedback resistance increase O/P.

$$-V_{OUT} = R_f\left(\frac{V_1}{R_1} + \frac{V_2}{R_2} + \frac{V_3}{R_3}\right) \ldots\text{etc}$$



OUTPUT:



$$\text{Vout} = \left(A_1 \times V_1\right) + \left(A_2 \times V_2\right)$$

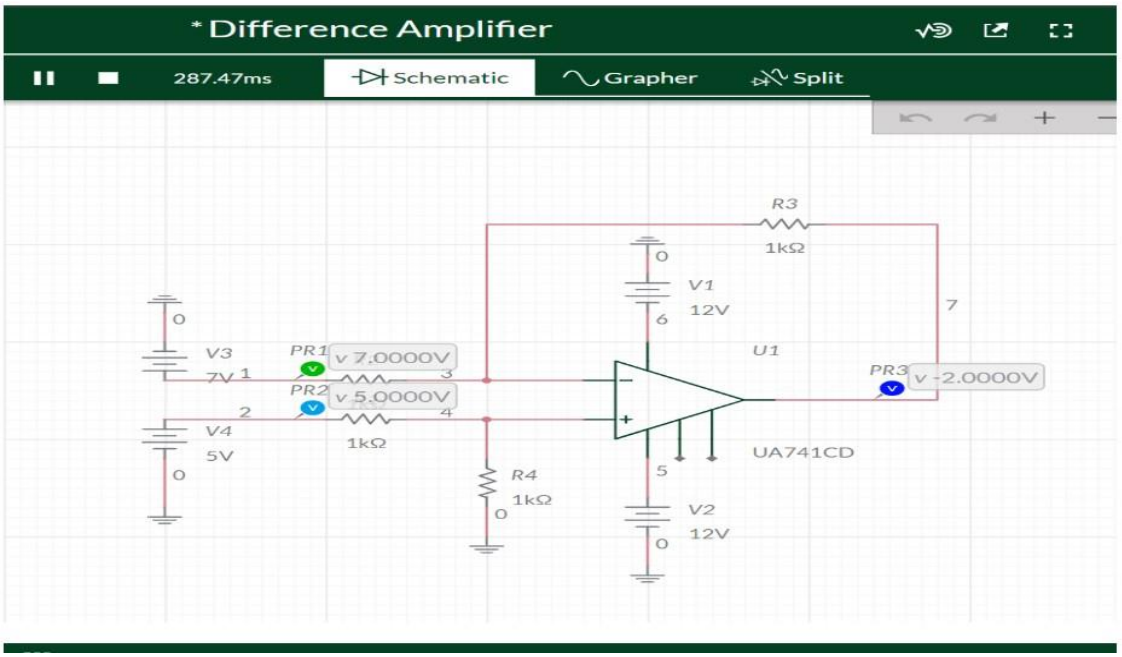
EXPERIMENT NO: 8(iv)

AIM: Design & draw the resulting waveform of difference amplifier. **Software:** Multisim 14 or above (online link: https://www.multisim.com/ after free signup)

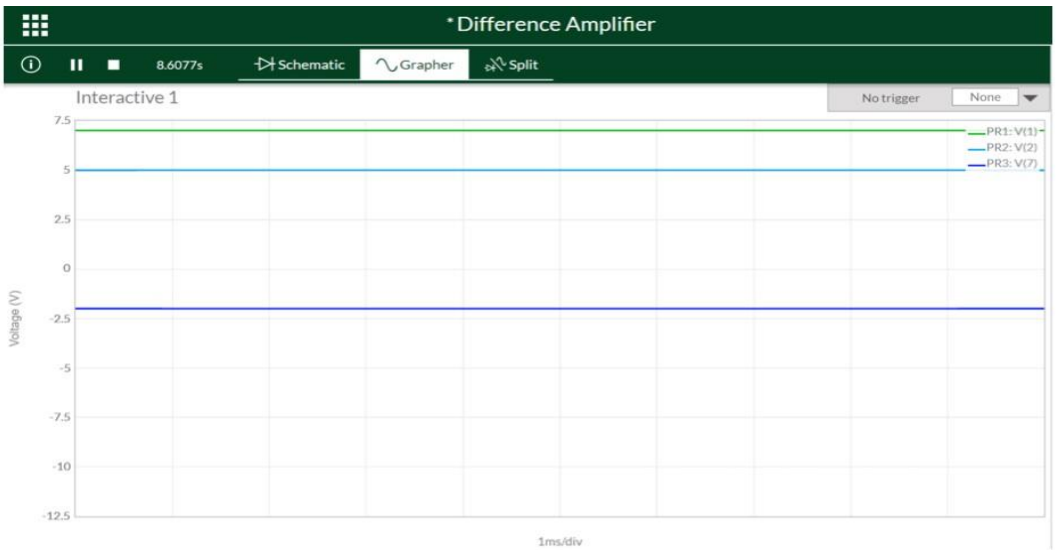
Procedure:

1. Open the workspace in Multisim
2. Drag and drop Op-Amp (UA741)
3. Drag more components and design the circuit shown below

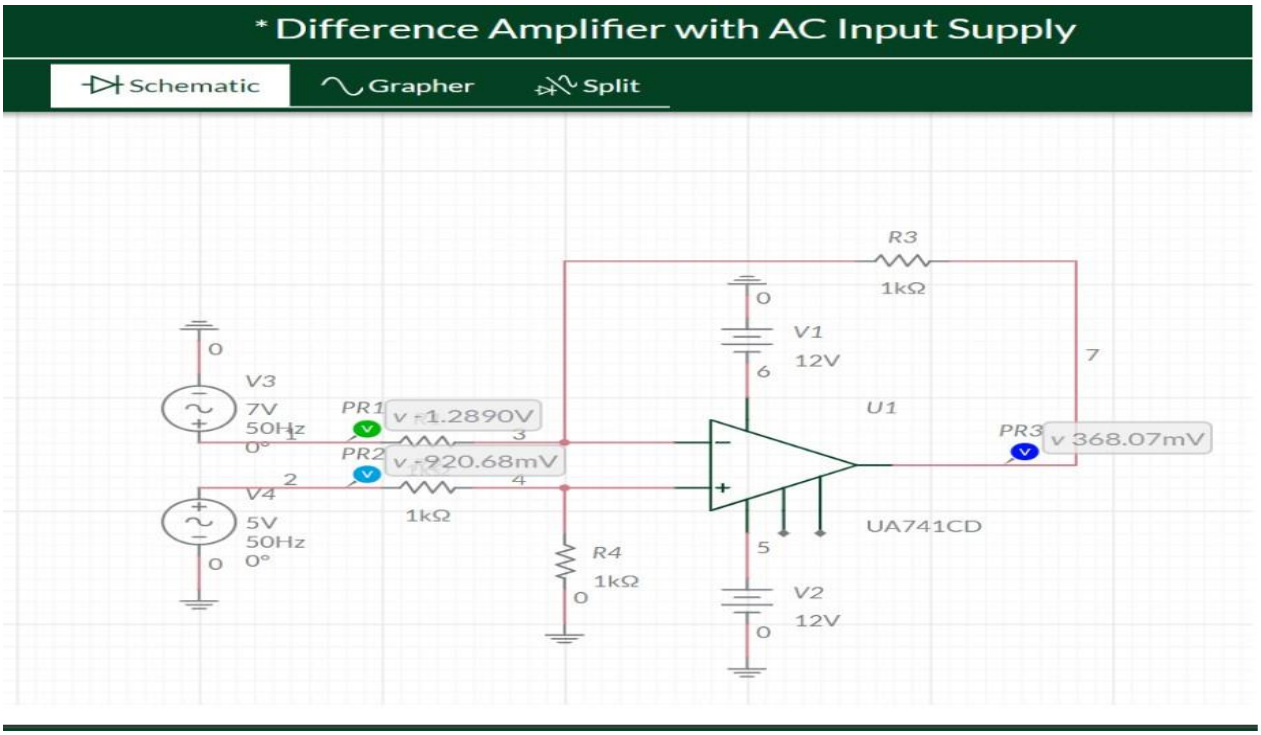
CIRCUIT DIAGRAM:



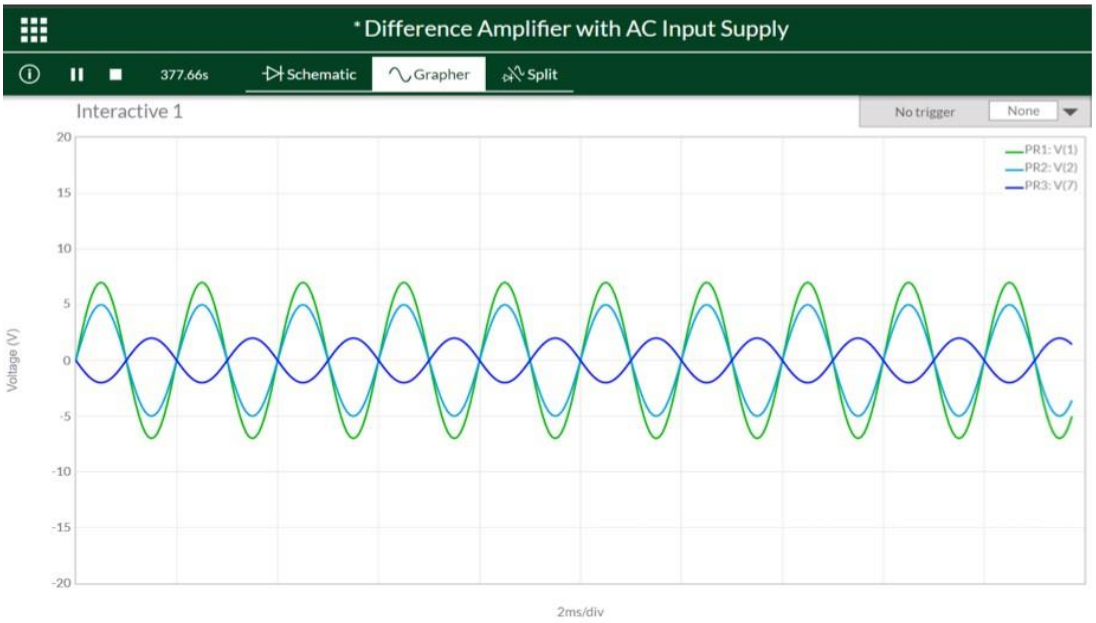
OUTPUT:



CIRCUIT DIAGRAM:



OUTPUT:



RESULT: Op-Amp gives the difference of the two input signal sources.

$$V_{OUT} = \frac{R_3}{R_1}(V_2 - V_1)$$