Experiment no.12

§ Summing Amplifier §

12.1 Objective:

To design and study the Summing operational amplifier (Inverting adder circuit using op amp 741).

12.2 Theory:

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

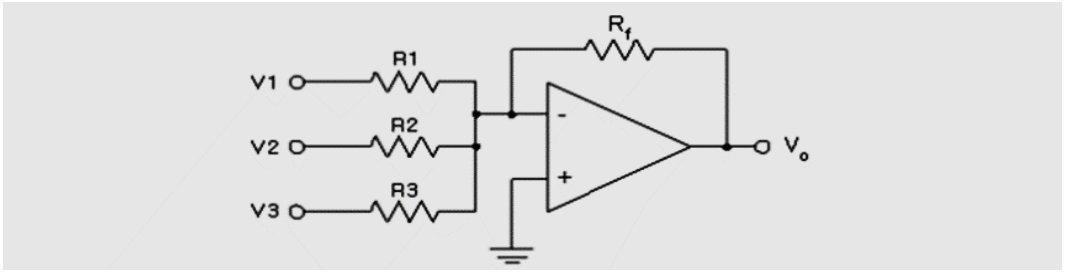

Figure (1)

$$V_o = -\left[\frac{R_f}{R1}V1 + \frac{R_f}{R2}V2 + \frac{R_f}{R3}V3\right] = -R_f\left[\frac{V1}{R1} + \frac{V2}{R2} + \frac{V3}{R3}\right]$$

Summing amplifier or an adder is used to sum two signal voltages. Voltage adder circuit is a simple circuit that enables you to add several signals together. It has wide variety of applications in electronic circuits. For example, on a precision amplifier, you may

need to add a small voltage to cancel the offset error of the op amp itself.

An audio mixer is another good example of adding waveforms (sounds) together from different channels (vocals, instruments) before sending the combined signal to a recorder.

You can change the gain or add another input without messing up with the gains of other inputs. Just remember that the inverting summing amplifier circuit inverts the input signals. That is not a big deal. If you need the opposite polarity, all you have to do is to put an inverting stage before or after the summer.

11.3 Procedure:

1. Enter specific (input voltage) (4VAC) and frequency (300Hz) from the power supply device and (2v DC) from the dc power supply, draw the two input waveform by using Oscilloscope.
2. Connect the circuit shown in the figure (2).

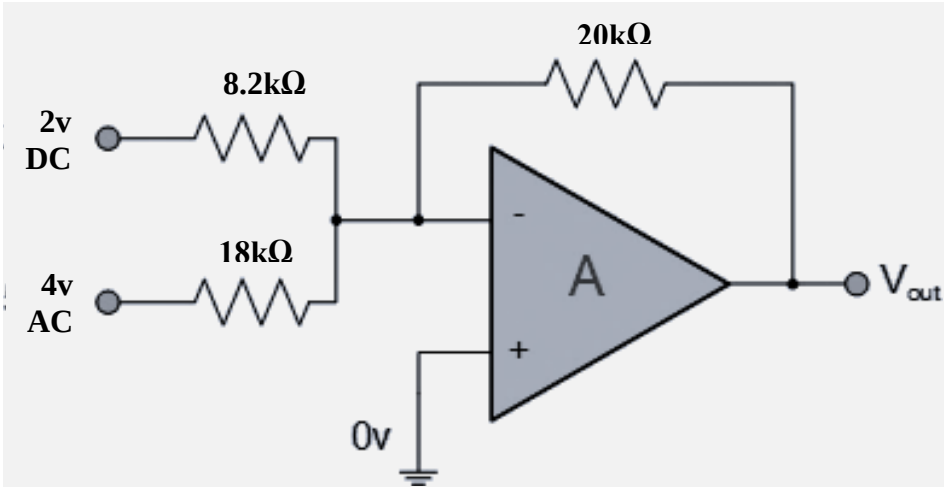

Figure (2)

3. Connect the first terminal of **OSC** to the output terminal of op-amp and second terminal of **OSC** to the ground.
4. Turn on the circuit and Draw output waveform.

11.4 Discussion:

1. calculate the value of the(Vout) theoretically?
2. Compere between practical and theoretically results?