



Name: \_\_\_\_\_ Roll #: \_\_\_\_\_

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## Summing Amplifier

### OBJECTIVE:

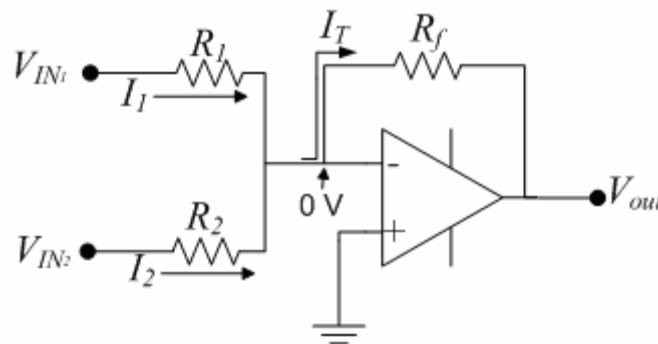
- To understand the summing action of an Op-amp.

### EQUIPMENTS:

- Oscilloscope.
- Function generator.
- DC power supply ( $\pm 12V$ ).
- Digital Multimeter.
- Breed board
- Connecting wires.
- Op-Amp I.C 741.
- Few Resistors

### THEORY DISCUSSION:

The summing amplifier is an application of the inverting op-amp configuration. The summing amplifier has two or more inputs, and its output voltage is proportional to the negative of the algebraic sum of its input voltages. A two input summing amplifier is shown in figure,



**Figure 1**

The two input voltages  $V_{IN1}$  and  $V_{IN2}$  are applied to the inputs and produce currents  $I_1$  and  $I_2$ . As the inverting (-) input of the op-amp is approximately 0 V (virtual ground),  $I_T = I_1 + I_2$ , which goes through the  $R_f$ . Since  $V_{out} = -I_T R_f$ ,

$$V_{OUT} = -(I_1 + I_2)R_f \dots\dots\dots 1$$

If all the input resistor have same value then,  $V_{OUT} = -(V_1 + V_2) \dots\dots\dots 2$ .

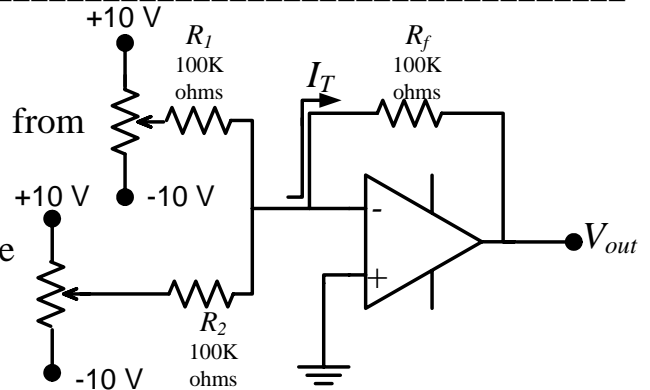
By choosing suitable values of resistors the input can be scaled in sum output. For example,  $V_{OUT} = -(2V_1 + V_2/3)$



Lab Experiment # 05

**PROCEDURE:**

1. Arrange the circuits shown in figure 2.
2. Adjust the Values of  $V_1$  and  $V_2$  derived from the potentiometer to a pair of values.
3. State out in the table and take measurements and complete the observation table below.



**OBSERVATIONS:**

$V_1$	$V_2$	$V_1 + V_2$	$V_{OUT}$	
			Calculated	Measured

Review Question

Q # 01. What will happen if two inputs of +8V are applied?

Ans: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Q # 02. Can you predict what will be the value of  $V_1 + V_2$ , required to put the positive peaks of output wave form at zero volts?

Ans: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Q # 03. How scaling of inputs can be achieved?

Ans: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**CONCLUSIONS:**

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_