



Exp.No.4

## DIFFERENCE AMPLIFIER - SUBTRACTOR

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### AIM:

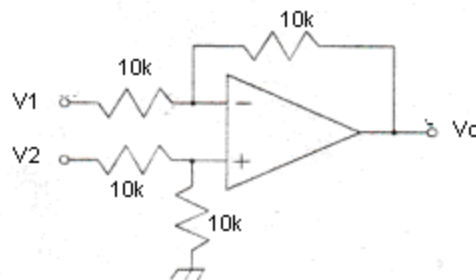
To design and construct a Subtractor using Op-amp IC741.

### APPARATUS:

1. Operational Amplifier mA 741 IC
2. Resistors 10KOhm
3. Dual Power supply( 0-20V)
4. Regulated Power Supply.(0-20V)
5. Multimeter
6. Bread board
- 7.Connecting wires

### THEORY:

Op-amp can be used to design a circuit whose output is proportional to or equal to the difference of two input signals. Such a circuit is called a difference amplifier or a subtractor. Below figure shows circuit of a subtractor.



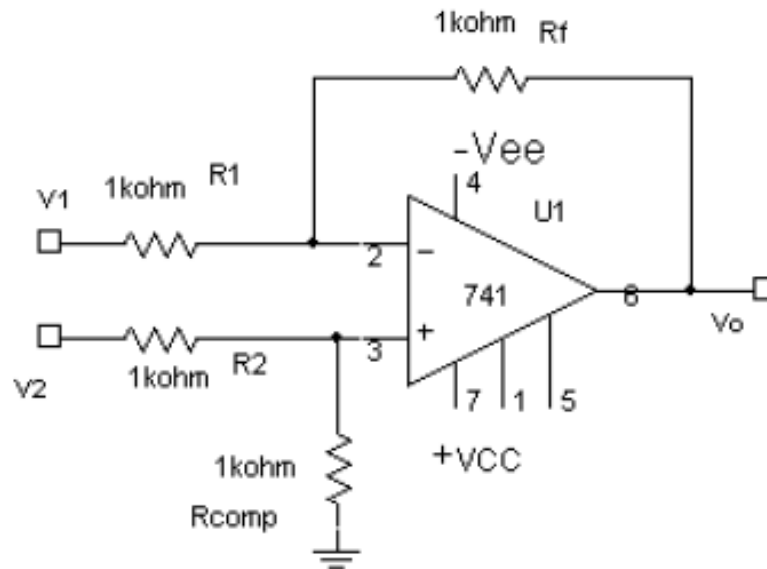
By connecting one input voltage V1 to inverting terminal and another input voltage V2 to the non – inverting terminal, we get the resulting circuit as the Subtractor. If all external resistance are equal in value, so the gain of the amplifier is equal to 1. The output voltages of the differential amplifier with a gain of unity is,

$$V_o = (V_2 - V_1)$$

Thus the output voltage Vo is equal to the voltage V2 applied to the non – inverting terminal minus the voltage V1 applied to the inverting terminal. Hence the circuit is called a Subtractor.



## CIRCUIT DIAGRAM:



## PROCEDURE:

1. Initially set  $+V_{cc} = 12$  volts and  $-V_{cc}$  to  $-12$  volts.
2. Measure all resistors that are used in the amplifier circuits using the multimeter and record these values
3. As shown in the circuit diagram connect the circuit for Subtractor on a breadboard
4. Before turning any power on, double check the wiring to make sure that it is correct. Make sure that the power supply to the op-amp is correctly wired as not to apply the incorrect polarity to the op-amp.
5. Apply dc voltages at each input terminal for  $V_1$  and  $V_2$  from the dc supply and check the output voltage  $V_o$  at the output terminal using the multimeter.
6. Tabulate 3 different sets of readings by repeating the above step.
7. Compare practical  $V_o$  with the theoretical output voltage  $V_o = (V_2 - V_1)$



### TABULAR COLUMN:

S.No.	V <sub>1</sub> Volts	V <sub>2</sub> Volts	Theoretical V <sub>o</sub> =V <sub>2</sub> -V <sub>1</sub>	Practical V <sub>o</sub> Volts

### RESULT:

The Practical Values of V<sub>o</sub> observed are equal to the theoretical values and output is a true replica of the subtraction values of the two inputs .

From this we can conclude that the Difference Amplifier or Subtractor using 741 OP-AMP is satisfying its function properly.