

EXPERIMENT NO.5

TITLE: DIFFERENTIAL CONFIGURATION OF OP-AMP AS SUBTRACTOR.

OBJECTIVES:

1. To assemble the circuit of subtractor using differential configuration of op-amp.
2. To measure the output voltage of subtractor.

LAB REQUIREMENTS:

Breadboard, Op-amp IC 741, Resistors(4 Nos), DC regulated Dual power supply (0-30V)-**2Nos**, Multimeter and connecting wires.

CIRCUIT DIAGRAM:

Subtractor using differential configuration of op-amp IC 741:

THEORY:**A Subtractor using differential configuration of op-amp IC 741:**

A basic differential amplifier of op-amp can be used as a subtractor as shown in the circuit diagram. In this circuit, input signals can be scaled to the desired values by selecting appropriate values for the external resistors; when this is done, the circuit is referred as scaling amplifier. However if all the resistors are of equal value, so gain of the amplifier will be one.

From the circuit, the output voltage of differential amplifier with gain 1 is-

$$v_o = -\frac{R}{R}(v_a - v_b)$$

i.e.

$$v_o = (v_b - v_a)$$

This means that the output voltage is equal to the voltage v_b applied to noninverting terminal minus the voltage v_a applied to inverting terminal of op-amp; hence the circuit is called as a subtractor.

EXPERIMENTAL PROCEDURE:

1. Refer the Pin Diagram of op-amp IC741 & assemble the circuits as per circuit diagram on the breadboard.
2. Select all the resistors of equal value.
3. Apply V_{CC} & $V_{EE} = \pm 15V$ from one DC regulated dual power supply.
4. Apply two input voltages of suitable value from another DC regulated dual power supply.
5. Measure the output voltage of the subtractor circuit with the help of digital multimeter & note the readings in the observation table.
6. Compare the reading with theoretical (expected) values of output voltage & interpret the result.

OBSERVATION TABLE:**Subtractor using differential configuration of op-amp IC 741:**

Sr. No.	Input Voltage (Va)	Input Voltage (Vb)	R (K Ω)	Output Voltage	
				Theo.	Prac.
1					
2					

CALCULATIONS:

RESULT:

For a subtractor using differential configuration of op-amp IC 741, practical value of output voltage is found to be_____. This means that

EVALUATION (BY TEACHER):

Excellent/Good/Average/Poor