

Indian Institute of Information Technology, Allahabad
Department of Electronics and Communication Engineering

Course Name: Electronics Measurement and Instrumentation

EXPERIMENT NO: 05

Objective: To find the gain of instrumentation amplifier using operational amplifier.

Materials Required:

Resistors, 741 op-amps IC, Voltage source, Multimeter, Bread board.

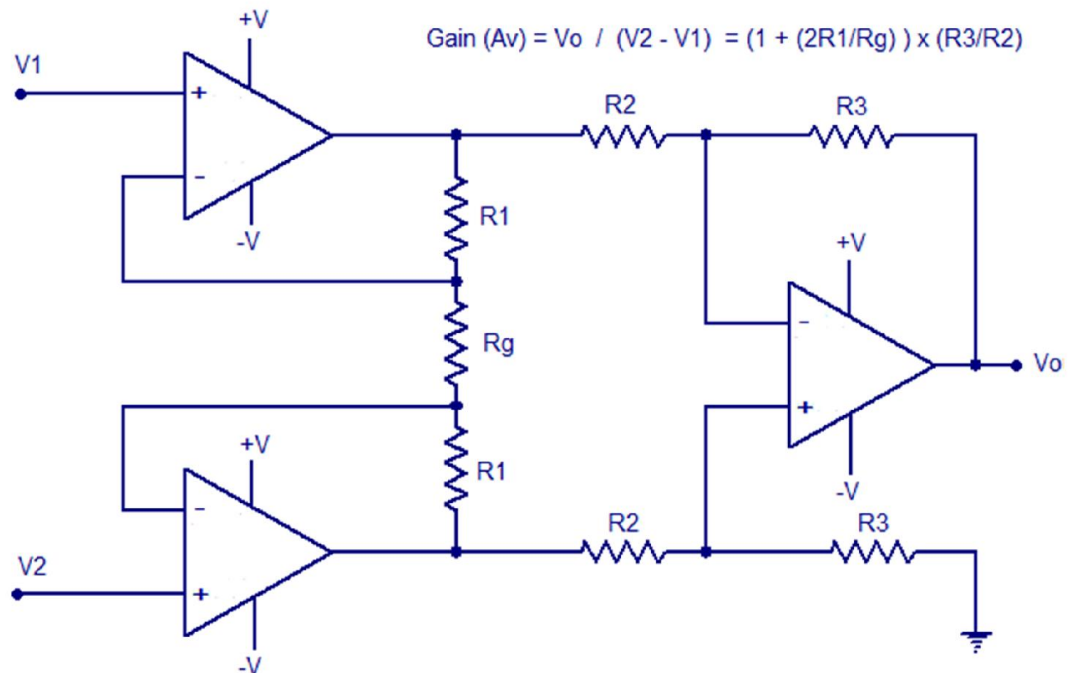
Theory:

Instrumentation amplifier is a kind of differential amplifier with additional buffer stages. The addition of buffer input makes it easy to match the amplifier with the proceeding stage. It's commonly used in industrial test and measurement application. It also has low off set voltage, high CMRR (Common mode rejection ratio), high input resistance and high gain etc.

Gain (A_v) = $V_o / V_2 - V_1$ or in terms of resistance

Gain (A_v) = $R_3 / R_2 (1 + 2R_1 / R_g)$

Circuit Diagram:



Circuit diagram of Instrumentation amplifier

Observation tables :

S.No.	V ₂ (in volt)	V ₁ (in volt)	V ₀ (in volt)	Gain (A _v) =V ₀ /V ₂ -V ₁
1.	4	5.01	-1.280	1.26
2.	6	5.01	1.21	1.21
3.	7	5.01	2.34	1.17

Calculation :

Theoretical gain is calculated by : $A_v = R_3/R_2 (1+2R_1/R_g)$

Where $R_1=1\text{ k}\Omega$, $R_2=5.6\text{ k}\Omega$, $R_3=5.6\text{ k}\Omega$ and $R_g=10\text{ k}\Omega$

So, $A_v = 5.6/5.6(1+2 \times 1/10) = 1.2$

And **experimental average gain** is,

Average gain (A_v) = $\frac{1.26+1.21+1.17}{3} = 1.21$

Results: We found the gain of instrumentation amplifier and the value of experimental average gain for instrumentation amplifier is 1.21.

Precautions:

- (a) Connections should be verified before clicking run button.
- (b) Check the components before use.