EXPERIMENT NO. 3

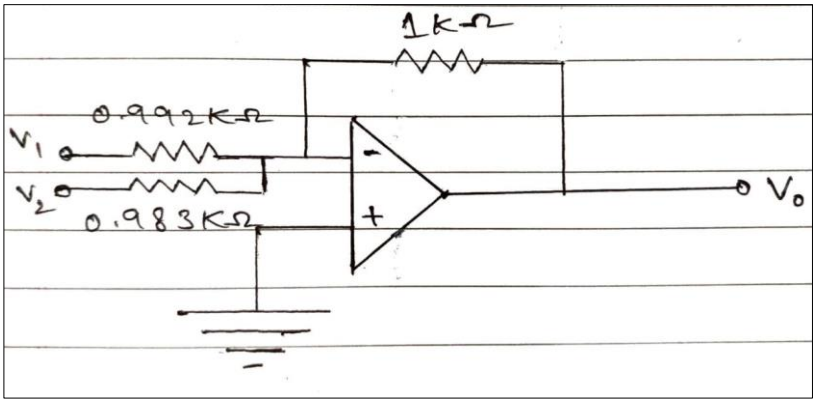
TITLE: Study of op-amp as an Inverting and Non Inverting Summer

OBJECTIVE: To study the Summing operation of Op-amp in inverting and non-inverting configuration.

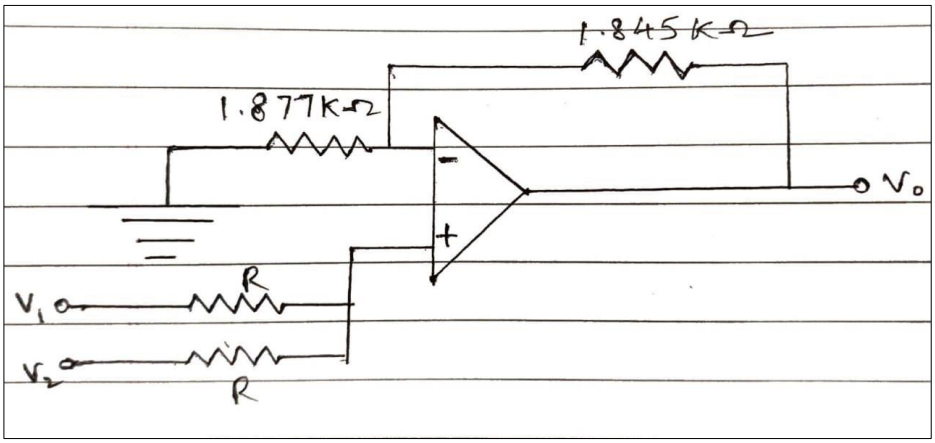
APPARATUS:

Sl. No.	Instruments/Apparatus	Range	Quantity
1	Experiment Board, ST2322	110-220 V ±10%, 50/60 Hz	1
2	Multi meter	1mV-1kV	1
3	Patch Cords	-	3

SETUP DIAGRAM:



Inverting Summer



Non-inverting summer

DATA SHEET:

1/8/24

Inverting Summer

V_1	V_2	Calculated V_1+V_2	Measured V_1+V_2	Error $\frac{\lvert Calculate - Observed \rvert}{Calculated} \times 100\%$
1.105	1.185	−2.319	−2.335	0.67%
1.45	1.65	−3.14	−3.186	1.4%
2.126	1.941	−4.117	−4.250	3.23%
2.55	2.80	−5.42	−5.585	3.04%
3.005	3.070	−6.152	−6.37	3.54%

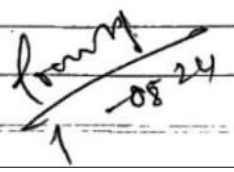
Non-Inverting Summer

V_1	V_2	Calculated V_1+V_2	Measured V_1+V_2	Error $\frac{\lvert Calculated - Obs \rvert}{Calculated} \times 100\%$
1.136	2.21	3.318	3.393	2.26%
1.545	2.86	4.367	4.568	4.6%
3.00	3.3	6.276	6.58	4.84%
3.55	3.7	7.19	7.46	3.76%
4.21	4.032	8.172	8.52	4.26%

Calculation:

$$V_o = \left(\frac{V_1+V_2}{2}\right)\left(1+\frac{R_f}{R}\right) = \left(\frac{1.136+2.21}{2}\right)\left(1+\frac{1.845}{1.877}\right)$$

$$= 3.318\ V$$



RESULTS & COMMENTS:

Op-amp as an inverting and non-inverting summer has been studied and verified.

1. Inverting Summer Configuration: The value of V_o is given by:

$V_o = -R_f (V_1/R_1 + V_2/R_2)$

where R_f is the feedback resistor, and R_1 and R_2 are the input resistors.

The calculated values of V_o closely match the measured values, as shown in the data sheet.

2. Non-inverting Summer Configuration: The value of V_o is given by:

$V_o = [(V_1 + V_2)/2] (1 + R_f/R)$

where R_f is the feedback resistor, and R is the resistance of the two input resistors.

The calculated values of V_o closely match the measured values, as shown in the data sheet.

Overall, both circuits demonstrated their theoretical principles effectively, with results aligning closely with predictions.