JADAVPUR UNIVERSITY

Faculty of Engineering & Technology

....Electronics.... Engg. Laboratory

Name TATHAGATA SUR

Class CSE-VG1 Sec A1 Roll No. 002310501030

Date of Experiment 22/01/24 Date of Submission 29/01/2024

Marks Obtained..... Signature of Examiner.....

NAME	CO-WORKER	ROLL
Shyam Sundar Karmakar		002310501025
Samim Sekh		002310501026
Pratyay Kar		002310501027
Joyasmit Pal		002310501028
Abir Chakraborty		002310501029
Aniruddh Modi		002310501031

Experiment No. 04-B

Commence at 11:00 AM Completed at 2:00 PM

Name of Teacher concerned

TITLE : Basic OP-AMP circuits

OBJECT : To study the function of OP-AMP as Inverting Amplifier, Non-Inverting Amplifier, Adder and Buffer

Apparatus used :-

(a) DC voltage supply (b) M741 IC
(c) Jump wires (d) Multi-meter as voltmeter
(e) Sine generator (f) Bread board
(g) Inverting amplifier circuit
(h) Non-inverting amplifier circuit
(i) Buffer circuit

Theory :-

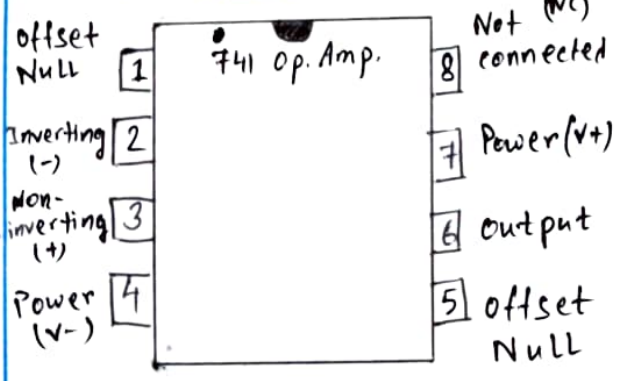
An inverting amplifier using OP-AMP gives an output wavefront phase opposite to the input wavefront. The gain for such circuits (A_v), is $\left(A_v = \frac{R_f}{R_i}\right)$ (where R_f = Feedback resistor, R_i = Input Resistance).
A buffer circuit gives the output as sum of several input.
For two input voltages V_1 and V_2 and input resistance as R_1 and R_2 :-

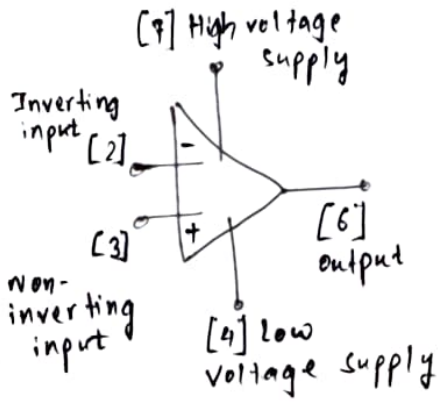
$$V_0 = -\left[\left(\frac{R_f}{R_1}\right)V_1 + \left(\frac{R_f}{R_2}\right)V_2\right]$$

($V_0 \rightarrow$ Output voltage) ($R_f \rightarrow$ Feedback resistor)

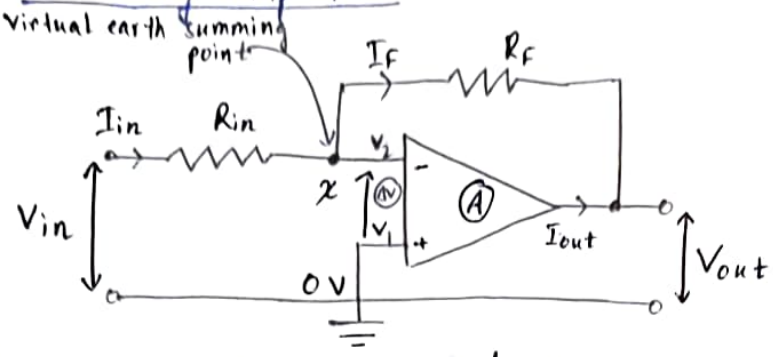
Circuit Diagrams :-

1) Functional diagram :

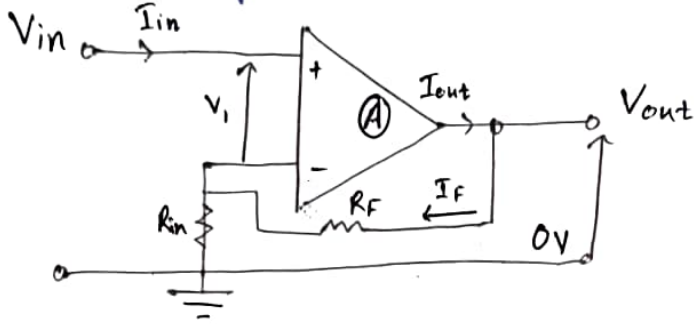




2) Inverting amplifier:



3) Non-inverting amplifier:



Observations:

i) Inverting amplifier

Input voltage = 2×1 = 2 V

Output voltage = 3.6×5 = 18 V

Experimental A_V = 18/2 = 9

Calculated $A_V = R_f/R_{in}$ = 100 kΩ/10 kΩ = 10

ii) Non-inverting amplifier

Input voltage = 0.2×1 = 0.2 V

Output voltage = 2.2 V

Experimental A_V = 2.2/0.2 = 11

Calculated $A_V = 1 + \frac{R_f}{R_{in}} = 1 + \left(\frac{100\ k\Omega}{10\ k\Omega}\right) = 11$

iii) Buffer

Sl No.	V_1 (V)	V_2 (V)	V(practical) (in V)	V(calculated) (in V)
1)	0.1	0.1	-3.04	-3.25
2)	0.1	0.2	-4.70	-4.62
3)	0.2	0.3	-7.90	-7.82
4)	0.4	0.2	-9.90	-9.96

iv) Summing amplifier

Voltage (V_1) = 0.22 V ; V_2 = 0.31 V

Observed value of output voltage = 8.47 V

Theoretical value

$$= -\left[(R_f/R_{in})V_1 + (R_f/R_{in})V_2\right]$$

$$= -\left[(100/5.6)\times 0.22 + (100/8.8)\times 0.31\right] \text{ V}$$

$$= -8.485 \text{ V}$$