CLASS : F.E.(COMMON) **SUBJECT : BXE**

EXPT. NO. : 3 **DATE :15/06/2021**

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Batch: C04

TITLE : OPAMP Application Circuits (Inverting and Non Inverting Amplifier)

OBJECTIVE :

a. To verify pin configuration of an Op-AMP amp(such as LM741)

b. To Verify the function of Inverting and Non Inverting Amplifier

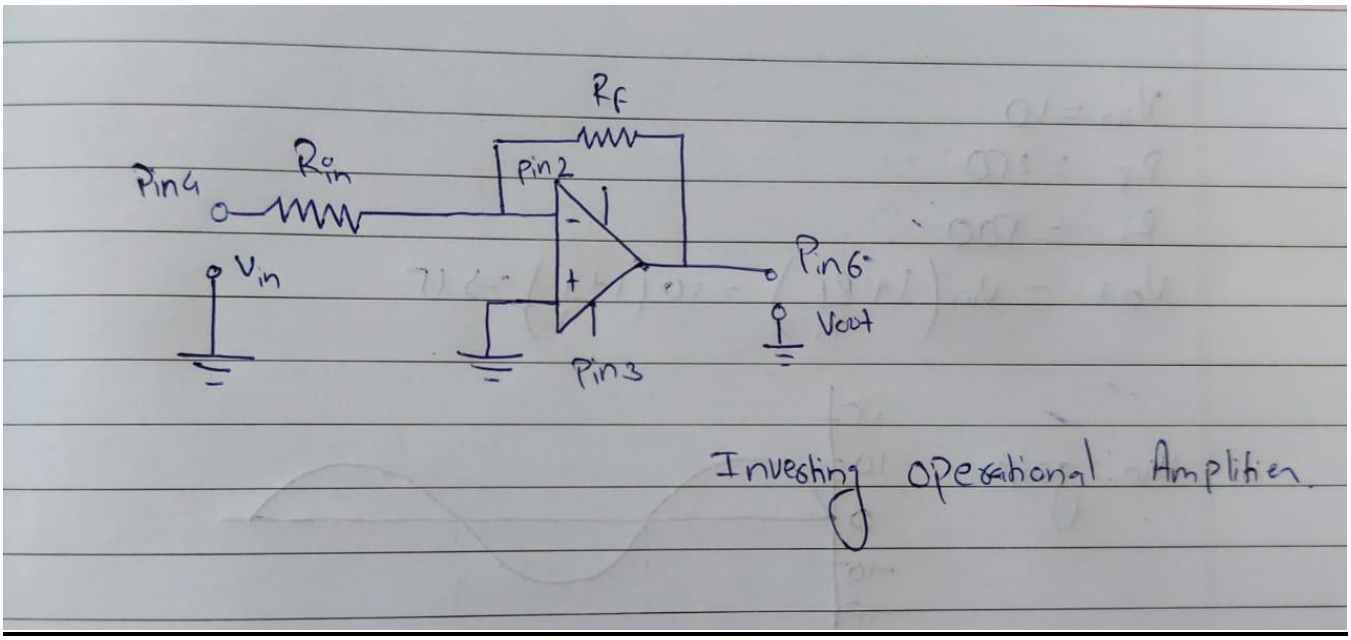
APPARATUS :

1. Op-Amp IC-741,
2. Digital multimeter
3. Resistors
4. Connecting wires/Patch cord
5. Breadboard
6. Virtual Lab environment with Login Credentials

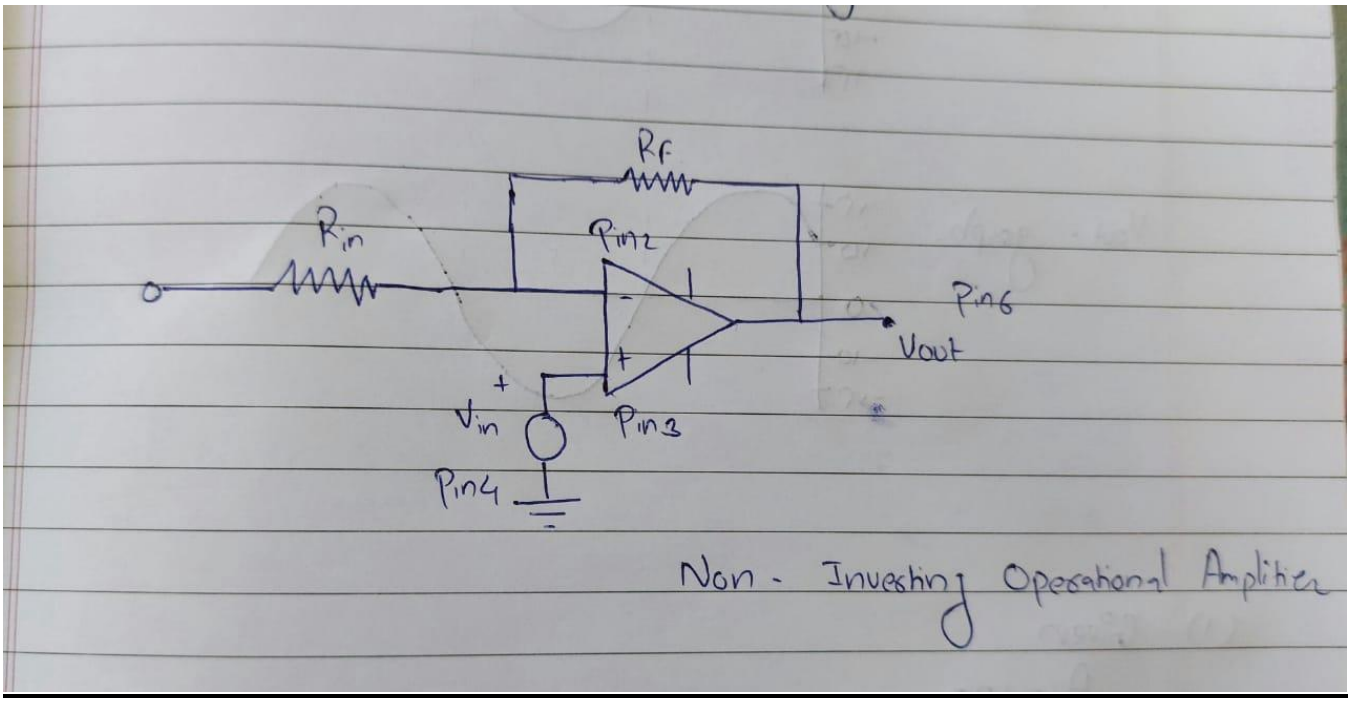
Note: This experiment is to be carried out using Virtual Labs as explained.

CITCUIT DIAGRAMS:

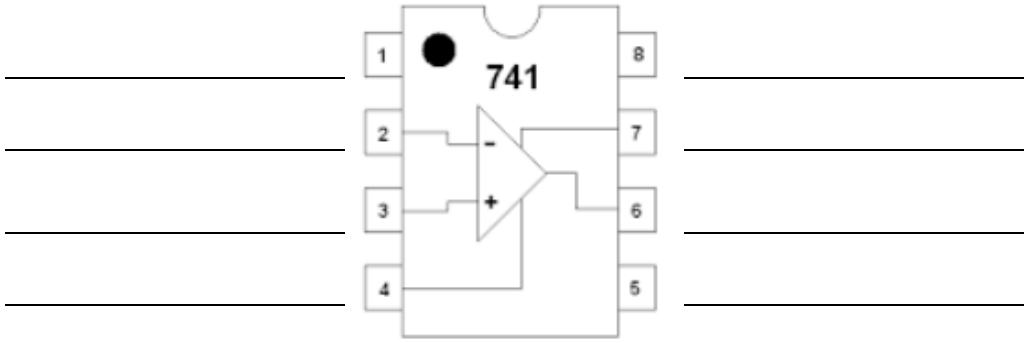
Draw the Circuit Diagram of Inverting Amplifier



Draw the Circuit Diagram of Non Inverting Amplifier



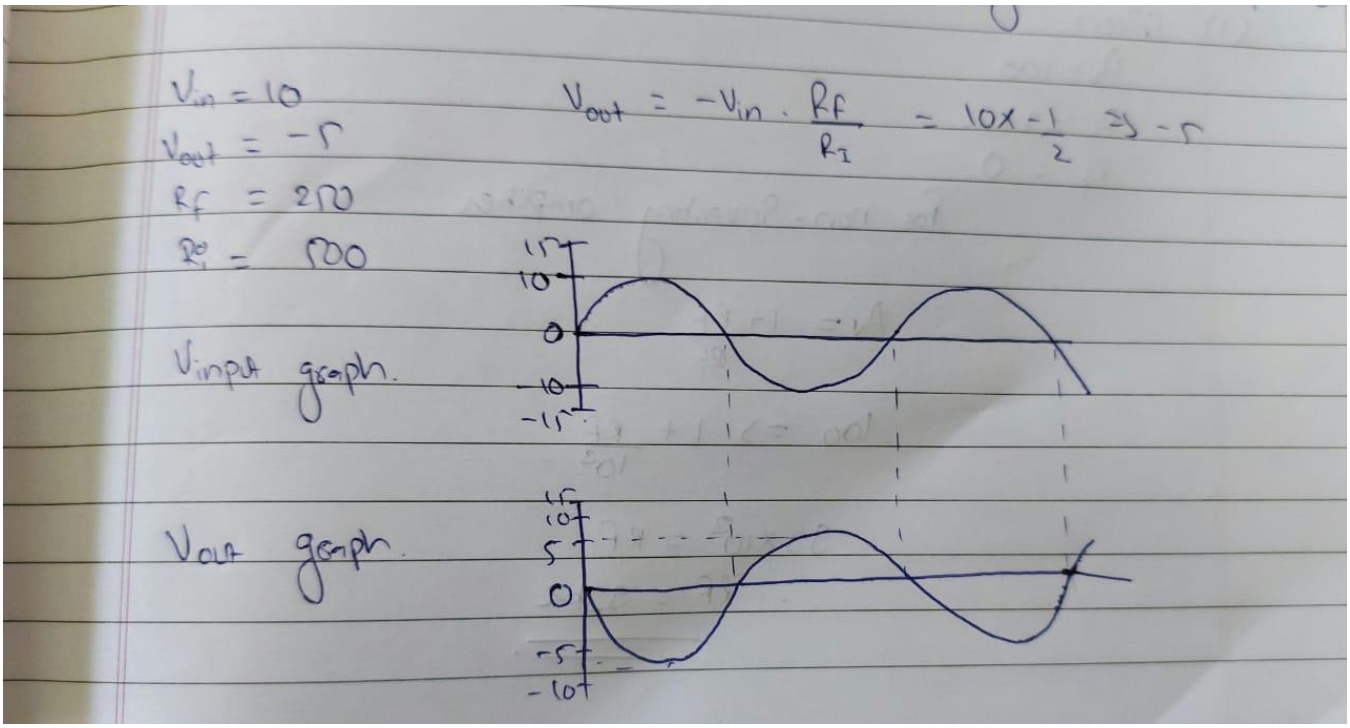
Write pin description



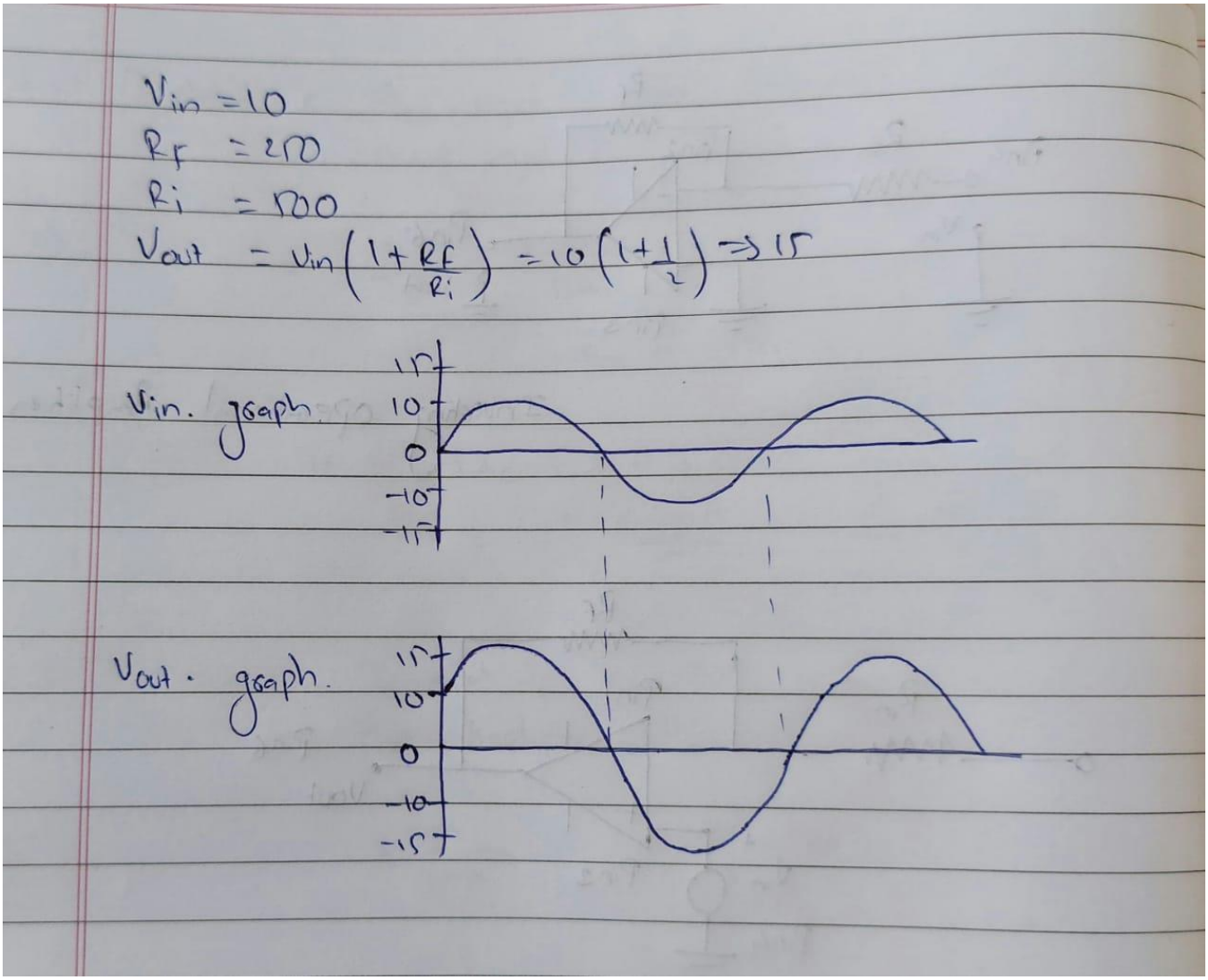
Note: Perform the experiment through virtual Labs, Take the reading for the output. Draw the wave forms for output and input signals for one set of reading for both the amplifiers.

Wave forms:

Inverting Amplifier



Non Inverting Amplifier


$V_{in} = 10$
$R_f = 2\Omega$
$R_i = 1\Omega$
$V_{out} = V_{in}\left(1 + \frac{R_f}{R_i}\right) = 10\left(1 + \frac{1}{2}\right) \Rightarrow 15$
V_{in}. graph
15
10
0
-10
-15
V_{out}. graph.
15
10
0
-10
-15

CALCULATION:

A: Inverting Amplifier

Sr.No	V_{in}	R_{in}	R_f	$\frac{V_{out}}{V_{in}} = -\frac{R_f}{R_i}$
1	-10	500	500	10
2	-10	250	500	15(saturation)
3	-10	500	250	5
4	10	500	500	-10
5	10	250	500	-15(saturation)
6	10	500	250	-5

B. Non Inverting Amplifier

Sr.No	V_{in}	R_{in}	R_f	$V_{out} = V_{in}\left(1 + \frac{R_f}{R_{in}}\right)$
1	-10	500	500	-20
2	-10	250	500	-15(saturation)
3	-10	500	250	-15
4	10	500	500	15(saturation)
5	10	250	500	15(saturation)
6	10	500	250	15

CONCLUSION :

1. An inverting amplifier is a type of operational amplifier circuit which produces an output which is out of phase with respect to its output by 180o.
2. The gain of inverting amplifier is -Rf/Ri
3. Non-inverting amplifier that produces an amplified signal at the output Having similar phase as that of the applied input.
4. In Non-inverting amplifier the gain is 1+Rf/Ri

Teacher Sign with Date **Remark**

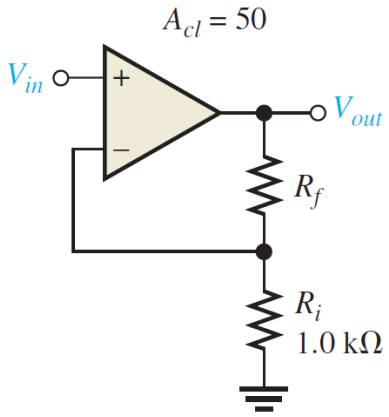
REFFRENCE:

1. Linear integrated circuits by Ramakant Gaikwad

2. Electronics Devices & circuits by L. Floyd

Assignment Questions: Answer the questions with detailed solution

1. Find the value of feedback resistor, R_f that will produce the closed-loop gain of 100.



(1) Given

$A_v = 100$

$R_i = 1\,k\Omega$

$R_f = 0$

for non-inverting amplifier

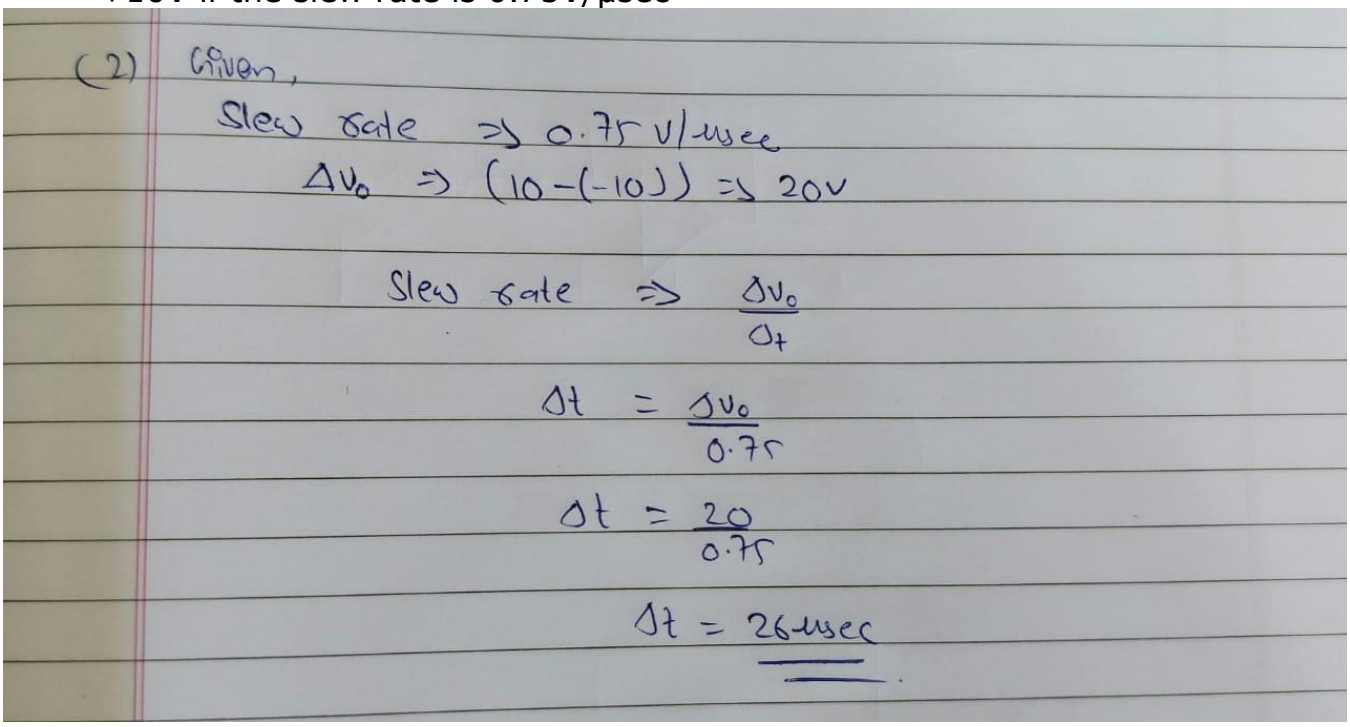
$$A_v = 1 + \frac{R_f}{R_i}$$

$$100 \Rightarrow 1 + \frac{R_f}{10^3}$$

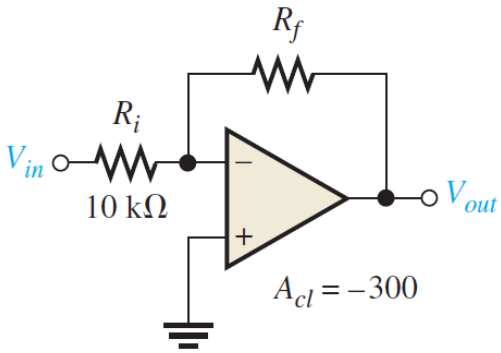
$$99 \times 10^3 = R_f$$

$$\therefore R_f = 99\,k\Omega$$

2. How long does it take the output voltage of an OpAmp to go from -10V to +10V if the slew rate is 0.75V/μsec



3. Find the value of feedback resistor, R_f which will produce the closed-loop gain of -300.



(3) Given, $R_i = 10k\Omega$.

$A_V = -300$

$R_f = ?$

for inverting operational amplifier

$A_V = -R_f/R_i$

$-300 = -\frac{R_f}{10^4}$

$3 \times 10^6 = R_f$

$R_f = 3000k\Omega$