EXPERIMENT -5

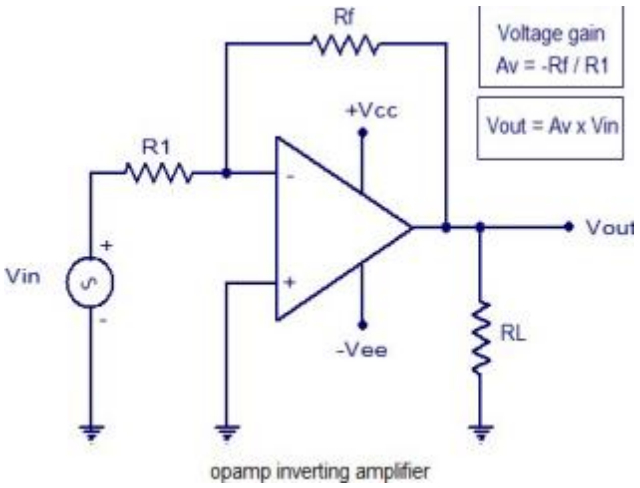
INVERTING AND NON-INVERTING AMPLIFIERS USING OP AMPS

AIM: To study the following using opamp -

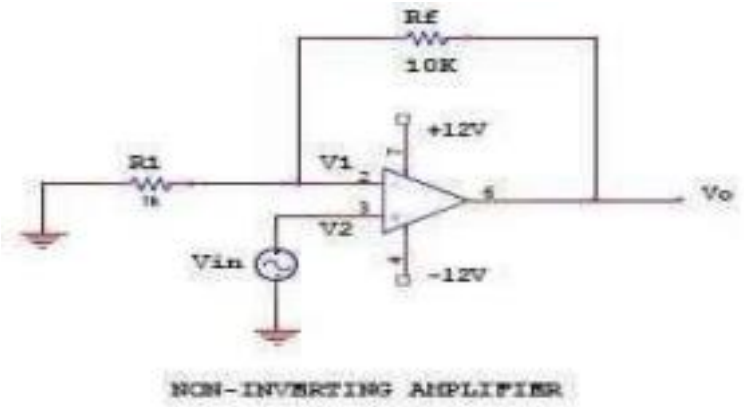
1. Inverting amplifier
2. Non-inverting Amplifier

Theory:
An inverting amplifier using opamp is a type of amplifier using opamp where the output waveform will be phase opposite to the input waveform. The input waveform will be amplified by the factor Av (voltage gain of the amplifier) in magnitude and its phase will be inverted. In the inverting amplifier circuit the signal to be amplified is applied to the inverting input of the opamp through the input resistance R1. Rf is the feedback resistor. Rf and Rin together determine the gain of the amplifier. Inverting operational amplifier gain can be expressed using the equation Av = – Rf/R1. Negative sign implies that the output signal is negated. The circuit diagram of a basic inverting amplifier using opamp is shown below.

CIRCUIT DIAGRAM:



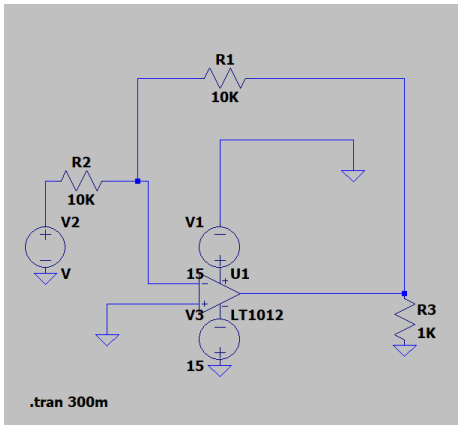
opamp inverting amplifier



NON-INVERTING AMPLIFIER

INVERTING AMPLIFIER :

CIRCUIT DIAGRAM :

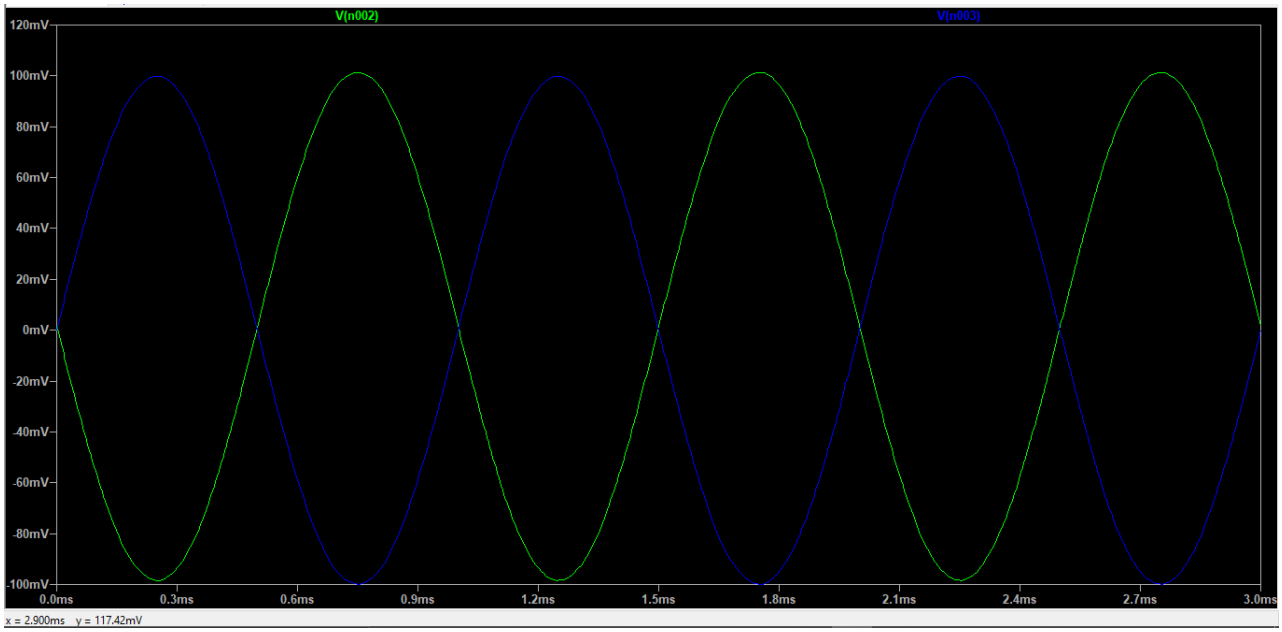


Formula :

$V_O=V_{IN}(1+R2/R1)$

Result :

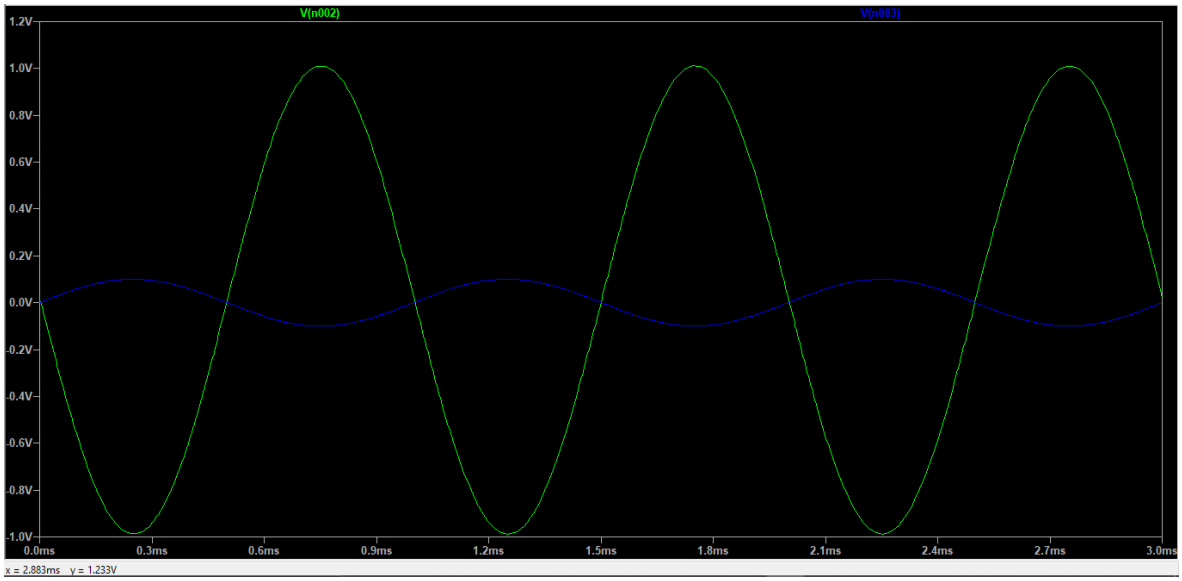
R1=10K ,R2=10k ,GAIN=1



V_{IN}	V_{OUT}
0 V	0 V
0.1 V	-0.1
0.3 V	-0.3
0.5 V	-0.5
0.7V	-0.7
0.9 V	-0.9

For Gain=10

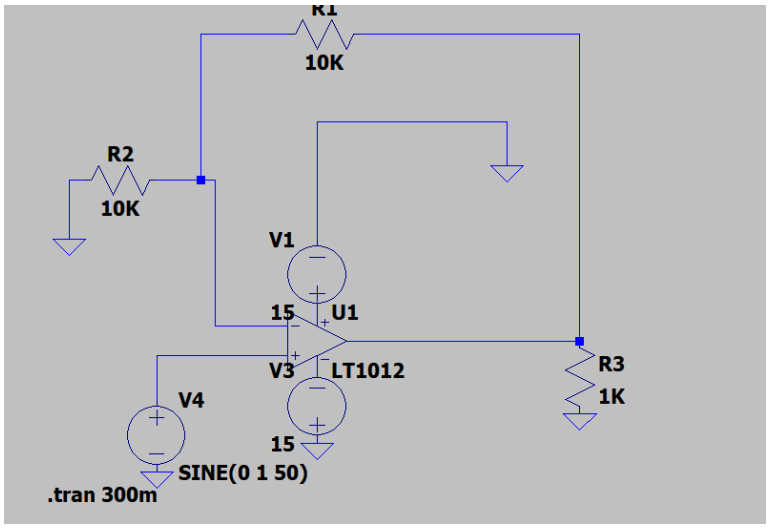
R1=10K , R2=100K



V_{IN}	V_{OUT}
0 V	0 V
0.1 V	-1
0.3 V	-3
0.5 V	-5
0.7V	-7
0.9 V	-9

NON-INVERTING AMPLIFIER :

CIRCUIT DIAGRAM :



Formula :

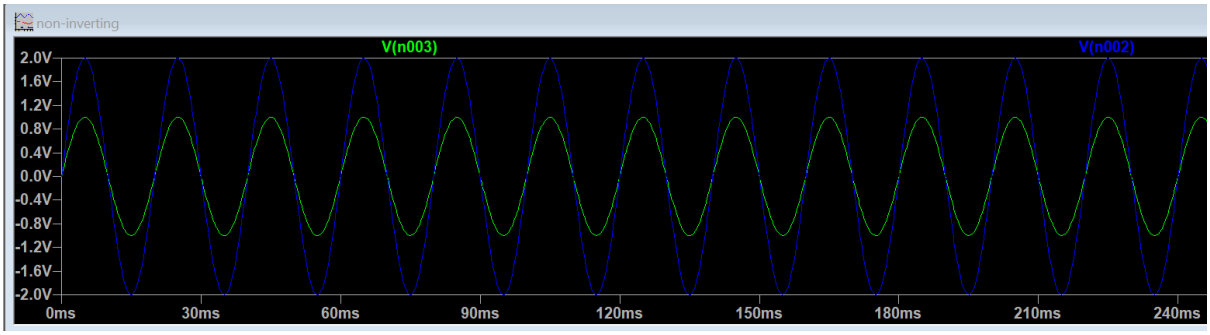
$V_O = V_{IN}\ (1+R2/R1)$

Result:

$R_1 = 10K$, $R_2 = 10K$

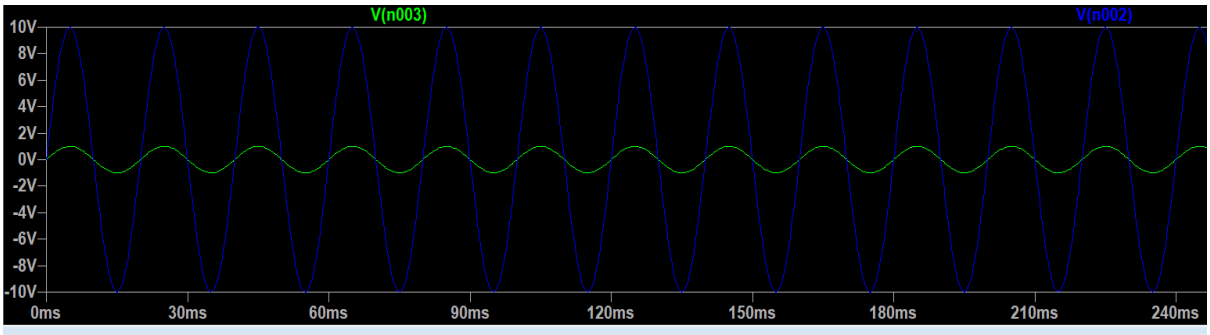
For Gain =2

V_{IN}	V_{OUT}
0	0
0.1	0.2
0.3	0.6
0.5	1.0
0.7	1.4
0.9	1.8



For Gain 10
R_1=10K , R_2=90K

V_{IN}	V_{OUT}
0V	0.0V
0.1V	1V
0.3V	3V
0.5V	5V
0.7V	7V
0.9V	9V



DISCUSSION-

An inverting operational amplifier is a type of operational amplifier that produces an output which is out of phase with respect to input 180 degree out of phase with gain of(-R2/R1).

While a non-inverting amplifier is a type of operational amplifier that produces an output which is in phase with respect to input 0 degree in phase with gain of(1+R2/R1).