

Experiment No. 6

INVERTING AND NON-INVERTING AMPLIFIER USING OPAMP

AIM

To study the following op-amp circuits

1. Inverting amplifier
2. Non-inverting amplifier

DESIGN

1. Design for inverting amplifier

The expression for gain is $A_{CL} = -\left(\frac{R_f}{R_1}\right)$

Let amplifier to be designed with a gain of (-10), select input resistance $R_1=10k\Omega$

Feedback resistance, $R_f = -(A_{CL} \times R_1)$
 $= -(-10 \times 10 \times 10^3) = 100 k\Omega$

2. Design for non- inverting amplifier

The expression for gain is $A_{CL} = \left(1 + \frac{R_f}{R_1}\right)$

Let amplifier to be designed with a gain 11 and select $R_1 = 10k\Omega$

Feedback resistance, $R_f = (A_{CL} - 1)R_1$
 $= (10 - 1) \times 10 \times 10^3 = 100 k\Omega$

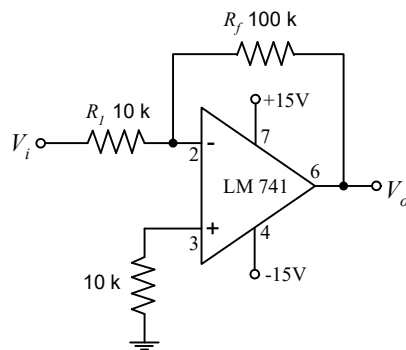


Fig 1. Circuit diagram of inverting amplifier

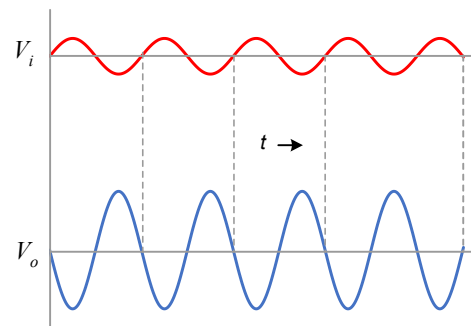
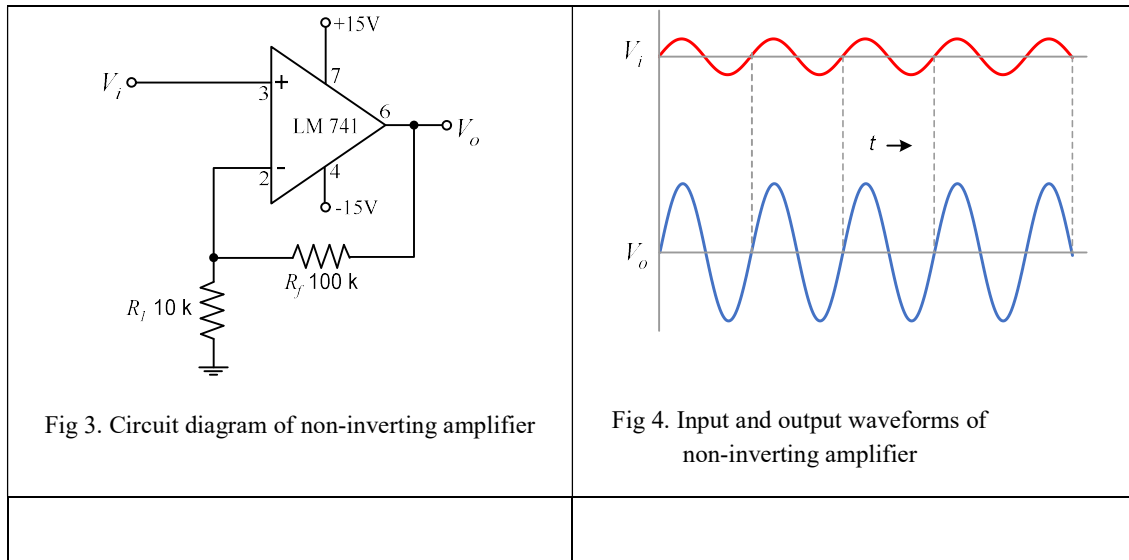


Fig 2. Input and output waveforms of inverting amplifier



PROCEDURE

1. Inverting Amplifier

Set up the circuit as shown in Fig 1. The circuit gives a closed loop gain $A_{CL} = -\left(\frac{R_f}{R_1}\right)$

. This gain is very small compared to the open loop gain of the op-amp. Test the circuit by applying the input signal of suitable amplitude (say 1V peak to peak) from a function generator. Observe the output waveform on the CRO and determine actual gain.

2. Non-inverting Amplifier:

The circuit of a non-inverting amplifier is shown in Fig 3. Its closed loop gain is $A_{CL} = \left(1 + \frac{R_f}{R_1}\right)$. The circuit is tested by applying the input signal of suitable amplitude

(say 1V peak to peak) from a function generator. Observe the output waveform on the CRO and determine actual gain.

OBSERVATIONS

Inverting Amplifier

Input Frequency F kHz	Input voltage (p-p) V_i V	Output voltage (p-p) V_o V	Gain $A_{CL} = \frac{V_o}{V_i}$

Non-inverting Amplifier

Input Frequency f kHz	Input voltage (p-p) V_i V	Output voltage (p-p) V_o V	Gain $A_{CL} = \frac{V_o}{V_i}$

RESULT

The basic op-amp circuits of inverting & non-inverting amplifiers were designed set up and output waveforms were obtained in a CRO. The gain obtained are

Inverting amplifier:

Gain =

Non-inverting amplifier:

Gain =