Exp.No.1

INVERTING AMPLIFIER

AIM:

To design and construct a Inverting amplifier using IC741 Op-amp.

APPARATUS:

1. Operational Amplifier mA 741 IC –1No.
2. Resistors 1KOhm and 10KOhm
3. Dual Power supply(0-20V)
4. Regulated Power Supply.(0-20V)
5. Multimeter
6. CRO and Probes
7. Funtion Signal Generator.
8. Bread board
9.Connecting wires

THEORY:

INVERTING AMPLIFIER:

An op-amp connected as an inverting amplifier with a controlled amount of voltage gain is shown in fig.

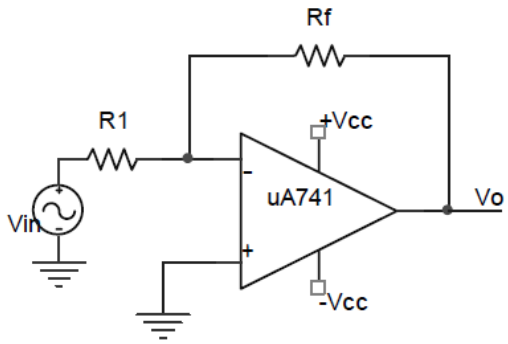


Fig: Inverting amplifier configuration of op-amp

The input signal is applied through a series input resistor R1 to the inverting input. The Non inverting input terminal is grounded. Also, the output is fed back through Rf to the same input. The non-inverting input is grounded. Rf and R1

together sets the gain of the amplifier. An expression for the output voltage of the inverting amplifier is written as

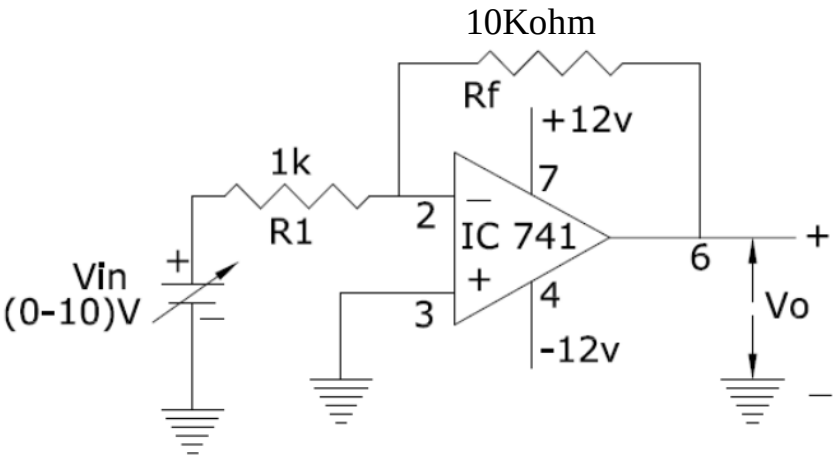
$$V_o = -\frac{R_f}{R_1} V_{in}$$

The –ve sign indicates inversion and the output voltage is 180^0 out of phase with respect to the input and amplified by gain A. The closed-loop gain of the inverting amplifier is, thus

$$A_{CL(I)} = -\frac{R_f}{R_1}$$

Assuming Rf is a 5k ohm resistor and R1 is a 1k ohm resistor, and Vin is +/- 1 volt triangle input, then Av would be -5 and Vout would be +/- 5volts triangle wave that is 180° out of phase compared to the input as shown in Expected Graph. Note how the output signal is 5 times larger than the input signal. For the special case, when Rf = R1 , Vout = - Vin a 180° phase shifted version of the input.
The interesting item about the inverting amplifier is that the gain is only a function of the ratio of the two resistors of R1 and R2.

CIRCUIT DIAGRAM:



PROCEDURE:

1.Initially set +Vcc = 12 volts and -Vcc to -12 volts.

2.Measure all resistors that are used in the amplifier circuits using the multimeter and record these values

3. As shown in the circuit diagram connect the circuit for Inverting amplifier on a breadboard

4.Before turning any power on, double check the wiring to make sure that it is correct. Make sure that the power supply to the op-amp is correctly wired as not to apply the incorrect polarity to the op-amp.
5. Input may be AC or DC voltages from function generator or DC power supply.

6. For DC input apply a 1-volt DC input to inverting input terminal of IC741 for Vin from the dc supply and check the output voltage Vo at the output terminal using the multimeter.

7.Compare practical Vo with the theoretical output voltage Vo = (-Rf /R1) Vin

8.For AC input connect the inverting input terminal of IC741 op-amp to function generator and output terminal to CRO.

9. Feed input from function generator and observe the output on CRO.

10. Draw the input and output waveforms on graph paper.

11. Compare the phase between the input and output waveforms.

TABULAR COLUMN:

S.NO	Vin	Vo = (-Rf /R1) Vin		Gain = Vo/Vin
		Theoretical	Practical	

EXPECTED GRAPH:

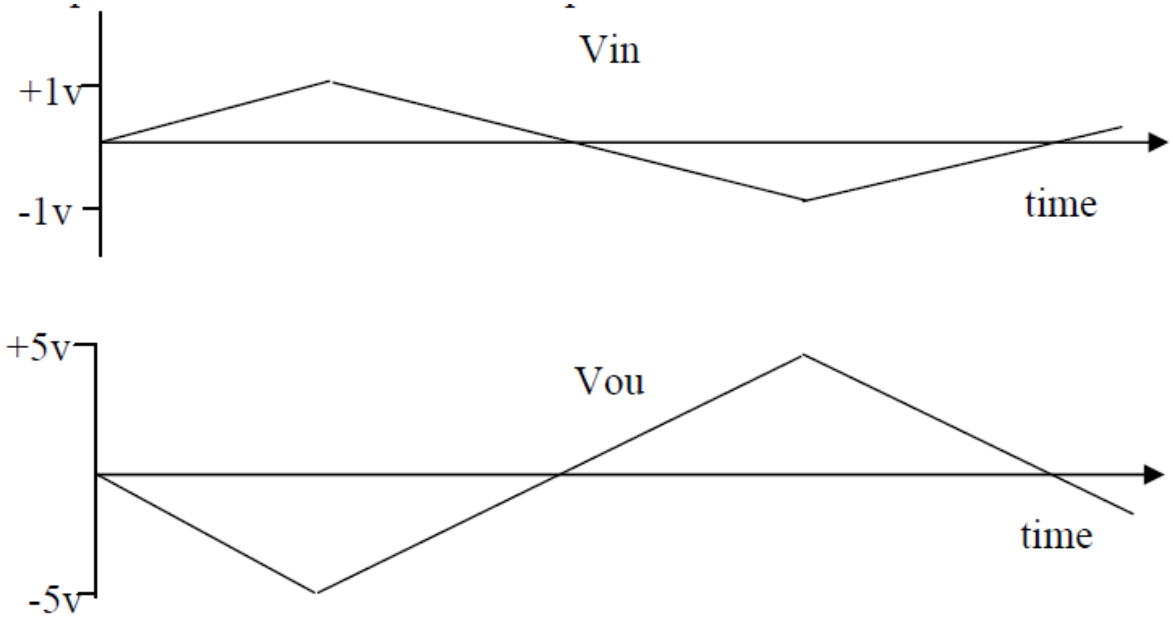


Fig: Output for -5 Gain Inverting Amplifier with a +/- 1 volt triangle wave input. R1=1k & R2=5k

WORKSHEET:

Input Waveform:

Output Waveform:

RESULT:

The Practical Values of V_o observed are equal to the Theoritical values. From this we can conclude that the Inverting Amplifier using 741 OP-AMP is satisfying its function properly. And it is also noticed that gain is depending on R_2 or R_f feedback Resistor.