Exp.No.2

NON - INVERTING AMPLIFIER

AIM:

To design and construct a Non- 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:

NON - INVERTING AMPLIFIER:

An op-amp connected in a closed-loop configuration as a non-inverting amplifier with a controlled amount of voltage gain is shown in Fig

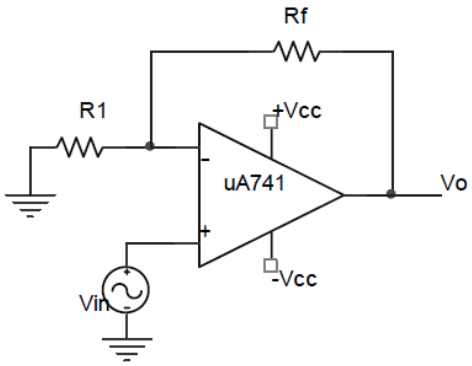


Fig: Non-inverting amplifier configuration of op-amp

The input signal is applied to the non-inverting (+) input. The output is applied back to the inverting(-) input through the feedback circuit (closed loop) formed by

the input resistor R1 and the feedback resistor Rf. This creates –ve feedback as follows. Resistors R1 & Rf form a voltage-divider circuit, which reduces V_O and connects the reduced voltage V_f to the inverting input. The feedback is expressed as

$$V_f = (\frac{R_1}{R_1 + R_f})Vo$$

The difference of the input voltage, V_{in} and the feedback voltage, V_f is the differential input of the op-amp. This differential voltage is amplified by the gain of the op-amp and produces an output voltage expressed as

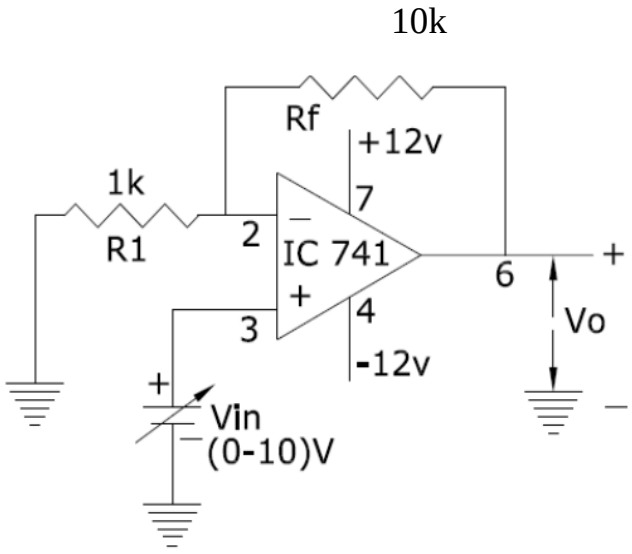
$$Vo = \left(1 + \frac{R_f}{R_1}\right)V_{in}$$

The closed-loop gain of the non-inverting amplifier is, thus

$$A_{CL(NI)} = 1 + \frac{R_f}{R_1}$$

Notice that the closed loop gain is
- Independent of open-loop gain of op-amp
- Set by selecting values of R1 and Rf

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

6.Compare practical Vo with the theoretical output voltage $Vo = Vin (1+ R_f / R1)$

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

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

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

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

TABULAR COLUMN:

S.NO	Vin	Vo = Vin (1+ Rf /R1)		Gain = Vo/Vin
		Theoretical	Practical	

EXPECTED GRAPH:

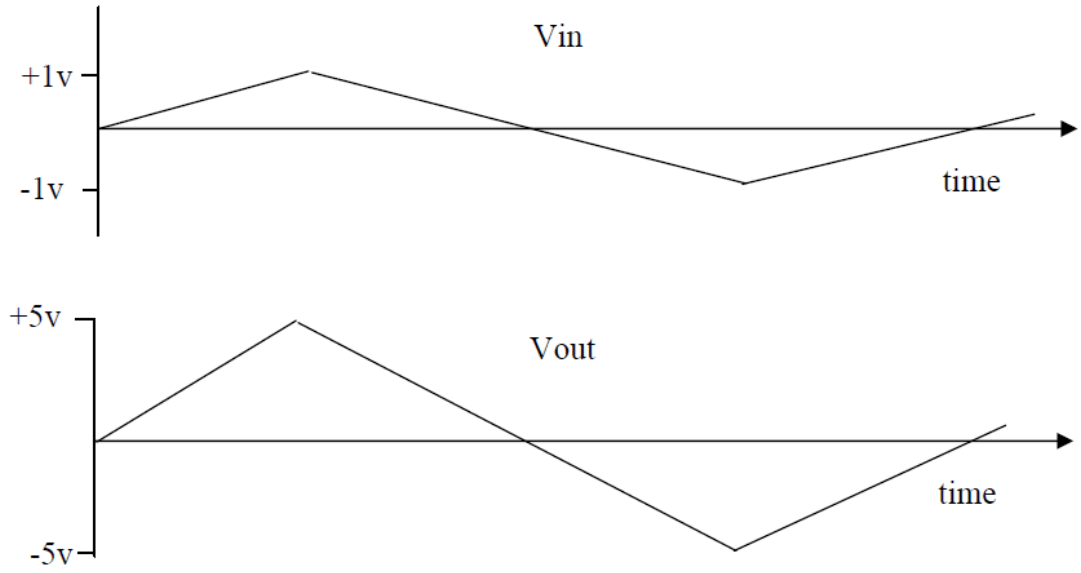
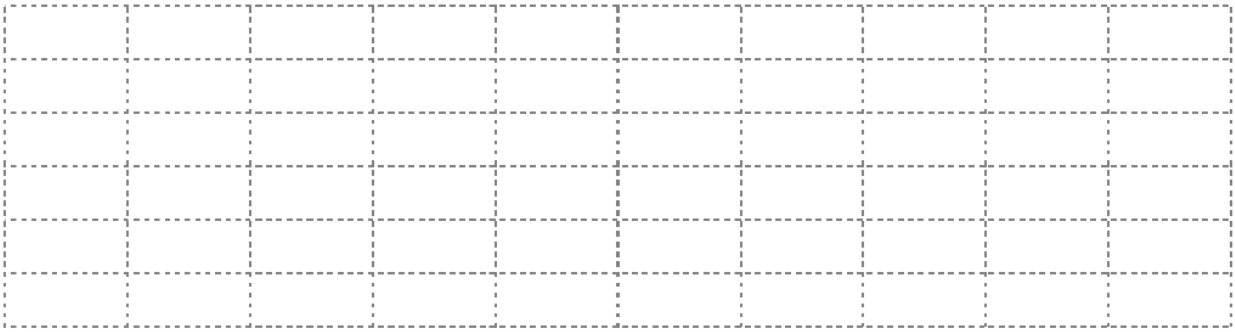


Fig: Output for +5 Gain Non-Inverting Amplifier with a +/- 1 volt triangle wave input. R1=1k & R2=4k

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 Non 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.