Indian Institute of Information Technology, Allahabad

ELECTRONICS AND COMMUNICATION ENGINEERING DEPARTMENT

Course Name: Analog Electronics

EXPERIMENT NO: 2

Objective:

To design and implement the circuit through 741 op-amp IC.

a) Inverting amplifier.
b) Non-Inverting Amplifier.

Materials/ Component Required :

Digital Storage Oscilloscope (DSO), Function Generator, DC Power Supply, 741 OPAMP IC – 01 No, Resistance (10K – 1 No, 100K – 1 No), Connecting leads

Theory:

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=10kΩ

   Feedback resistance, $R_f = -(A_{CL} \times R_1)$

   $$= -(-10 \times 10 \times 10^3) = 100\ k\Omega$$

2. Design for non- inverting amplifier

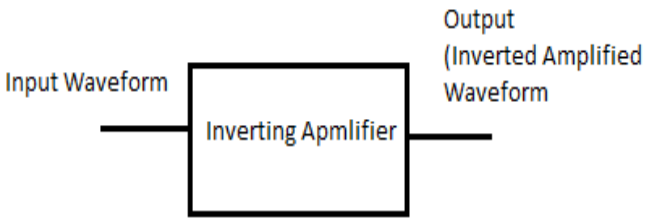
   The expression for gain is $A_{CL} = \left(1 + \frac{R_f}{R_1}\right)$

   Let amplifier to be designed with a gain 11 and select R_1 = 10kΩ

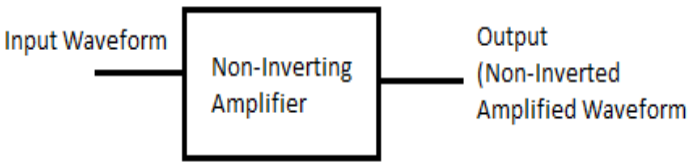
   Feedback resistance, $Rf = (A_{CL} - 1)R_1$

   $$= (10 - 1) \times 10 \times 10^3 = 100\ k\Omega$$

Block Diagram:



Inverting Amplifier



Non-Inverting Amplifier

Circuit Diagram:

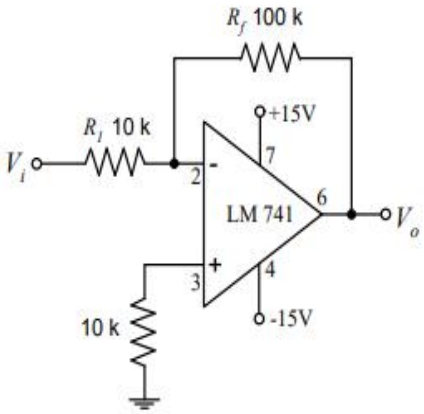


Fig 1. Circuit diagram of inverting amplifier

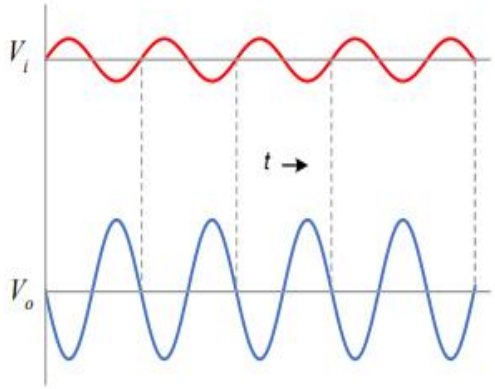


Fig 2. Input and output waveforms of inverting amplifier

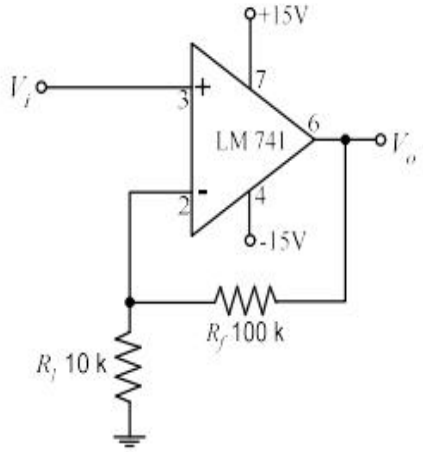


Fig 3. Circuit diagram of non-inverting amplifier

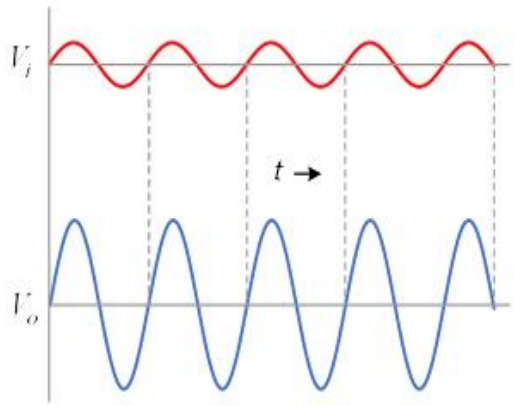


Fig 4. Input and output waveforms of non-inverting amplifier

Observation Table:

For Inverting Amplifier

Input Frequency F (KHz)	Input Voltage Vi (Volts)	Output Voltage Vo (Volts)	Gain A = (Vo/Vi)

For Non-Inverting Amplifier

Input Frequency f (KHz)	Input Voltage Vi (Volts)	Output Voltage Vo (Volts)	Gain A = (Vo/Vi)

Report:

a) Define peak inverse voltage (PIV)? And write its value for Full-wave rectifiers?
b) What is the mathematical expression for ripple factor?
c) Explain how capacitor helps to improve the ripple factor?

Calculation:

Graph:

Trace the Input and Output waveform observed in CRO/DSO.

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 = …….

Precautions:

a) Connections should be verified before clicking run button.
b) Before switch ON the instruments the connection should be verified.

References:

1. R.A. Gayakward, "Op-Amps and Linear Integrated Circuits" 4th Ed. Pearson-Prentice Hall