EXPERIMENT NO.2

TITLE: OP-AMP AS AN NONINVERTING FEEDBACK AMPLIFIER & VOLTAGE FOLLOWER.

OBJECTIVES:

1. To observe & plot the output waveform for non-inverting feedback amplifier circuit.
2. To calculate the closed loop gain for non-inverting feedback amplifier circuit.
3. To observe & plot the output waveform for voltage follower circuit.

LAB REQUIREMENTS:

Breadboard, Op-amp IC 741, Resistors(R1& Rf), DC regulated power supply (0-30V), Function Generator, Oscilloscope and connecting wires/Probes.

CIRCUIT DIAGRAM:

1. **Non-inverting feedback amplifier circuit using op-amp IC 741:**

2. **Voltage Follower Circuit using Op-amp IC 741:**

THEORY:

a) Non-inverting feedback amplifier circuit using op-amp IC 741:

The circuit shown in **(1)** is commonly known as a non-inverting amplifier with feedback (or closed loop non-inverting amplifier) because it uses feedback and the input signal is applied to the non-inverting input terminal of an op-amp.

Specifically voltage gain of op-amp with and without feedback, and the gain of the feedback circuit are defined as follows:

Open loop voltage gain (gain without feedback) $\boldsymbol{A = \frac{v_o}{v_{id}}}$

Closed loop voltage gain (gain with feedback) $\boldsymbol{A_F = \frac{v_o}{v_{in}}}$

Gain of feedback circuit $\boldsymbol{B = \frac{v_f}{v_o}}$

Ideally the gain of the non-inverting feedback amplifier is determined by the ratio of two resistors R_1 & R_F and is given as-

$$\boldsymbol{A_F = 1 + \frac{R_F}{R_1}}$$

b) Voltage Follower Circuit using Op-amp IC 741:

The circuit shown in **(2)** is commonly known as a voltage follower circuit because the output voltage is equal to and in phase with the input. The lowest gain that can be obtained from a non-inverting amplifier is 1 and when non- inverting amplifier is configured for unity gain, it is called as voltage follower. In this circuit the output is fed back into non-inverting terminal of an op-amp.

Ideally the gain of the voltage follower circuit is given as-

$$\boldsymbol{A_F = 1}$$

EXPERIMENTAL PROCEDURE:

1. Refer the Pin Diagram of op-amp IC741 & assemble the circuits as per circuit diagram on the breadboard.
2. Apply V_{CC} & V_{EE} = ±15V from DC regulated power supply.
3. Apply AC Input Signal of suitable amplitude and frequency from the function generator.
4. Measure the output voltage & note the readings in the observation table.
5. Observe the output waveforms on oscilloscope.
6. Plot the waveforms on the graph paper.

OBSERVATION TABLE:

A) Op-amp as non-inverting feedback amplifier:

Sr. No.	Input Voltage Frequncy (Hz)	Input Voltage Amplitude (Vpp)	R1(Ω)	R_F (Ω)	Output Voltage Amplitude (Vpp)	Voltage Gain	
						Theo.	Prac.

B) Op-amp as voltage follower:

Sr. No.	Input Voltage Frequncy (Hz)	Input Voltage Amplitude (Vpp)	R1(Ω)	R_F (Ω)	Output Voltage Amplitude (Vpp)	Voltage Gain	
						Theo.	Prac.

CALCULATIONS:

RESULT:

1. **For non-inverting feedback amplifier using op-amp, practical value of closed loop gain is found to be_____.**
2. **For Voltage follower circuit using op-amp it is observed that_____.**

EVALUATION(FOR TEACHER):

Excellent/Good/Average/Poor