Kathmandu University
Department of Electrical and Electronics Engineering
ANALOG ELECTRONICS LABORATORY EXPERIMENTS

EXPERIMENT 11: Simple Voltage Op-Amp Application

Objective: To understand the basic configuration of an operational amplifier

Materials and Equipment:
IC741: 1 Resistor: 100KΩ [1], 12KΩ [1], 2KΩ [1] Oscilloscope Probes: 3

Theory:
Differential amplifier forms the heart of an operational amplifier. It is a ready to use IC for variety of low frequency applications like amplifier, comparator, oscillator etc. Operational amplifier is mostly used in a closed loop configuration since the open loop gain is very high and difficult to handle.

Procedure

Buffer Amplifier with Slew Rate Effect

1. Connect the circuit as shown in fig 1.
2. Set V_{CC} = 15V and V_{EE} = -15V. Input is 1V pk-pk sine @ 500 Hz.
3. See the output in YT mode as well as in XY mode. Find the Gain.
4. Change the input to square waveform.
5. Note the output at 1 kHz, 2 kHz and 3 kHz in X10 MAG mode.

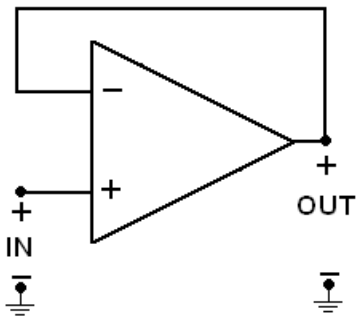

Fig: 1

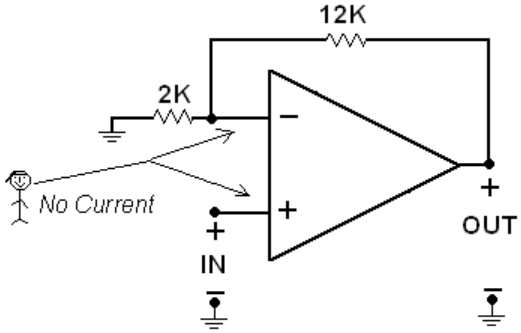

Fig: 2

Non Inverting Amplifier

1. Connect the circuit as shown in fig 2.
2. Set input to 1V pk-pk sine @ 500 Hz.
3. Find the voltage gain and phase shift between input and output.
4. See the output in XY mode.
5. Increase the input amplitude and find the saturation limits.
6. Sketch the output in YT mode for larger amplitude level.

Frequency Response

1. Set input to 1V pk-pk sine @ 500 Hz.
2. Find the gain at 500 Hz, 1 kHz, 10 kHz and 30 kHz.
3. Replace 12K resistor by 100K.
4. Set input to 100 mV pk-pk sine @ 500 Hz.
5. Find the gain at 500 Hz, 1 kHz, 10 kHz and 30 kHz.

Inverting Amplifier

1. Connect the circuit as shown in fig 3.
2. Set input to 1V pk-pk sine @ 500 Hz.
3. Find the voltage gain and phase shift between input and output.
4. See the output in XY mode.
5. Increase the input amplitude and find the saturation limits.
6. Sketch the output in YT mode for larger amplitude level.

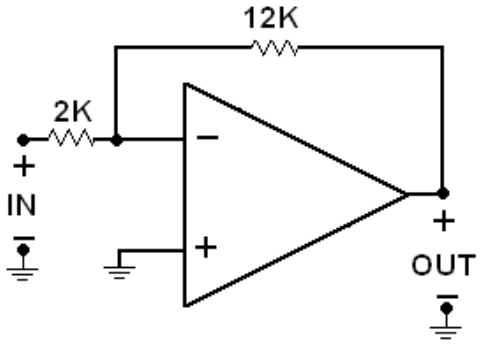

Fig: 3