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Experiment No. 9 – Inverting and Non-Inverting Amplifier using OPAMP

| **Aim and Objective of the Experiment:** |
|---|
| ● To understand the open loop configuration of OPAMP
● To understand the concept of negative feedback and closed loop configuration of OPAMP.
● To understand inverting and Non-inverting amplifier of OPAMP
● To find gain of inverting and non-inverting amplifiers |

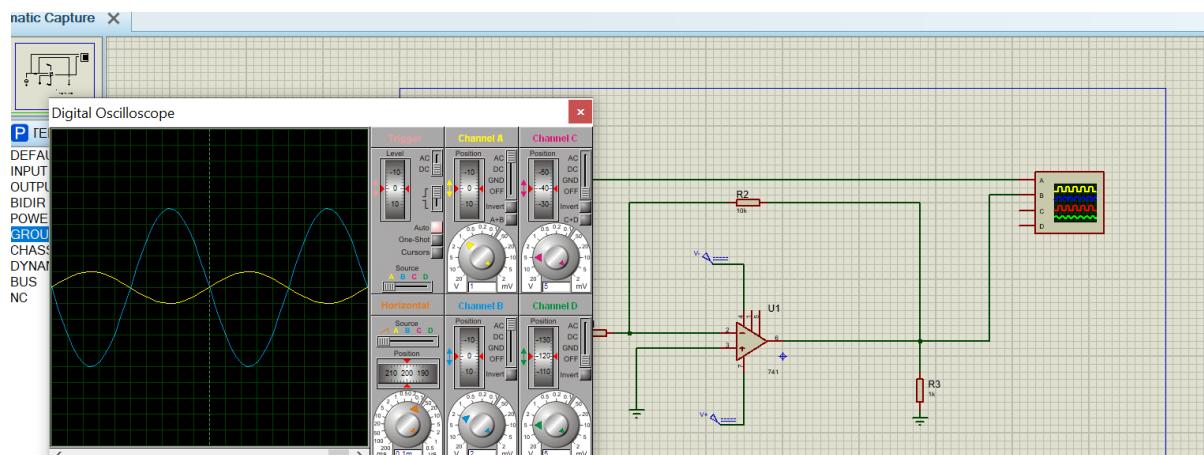| **COs to be achieved:** |
|---|
| **CO5:** Understand operational amplifier and its applications |

Circuit Diagram:
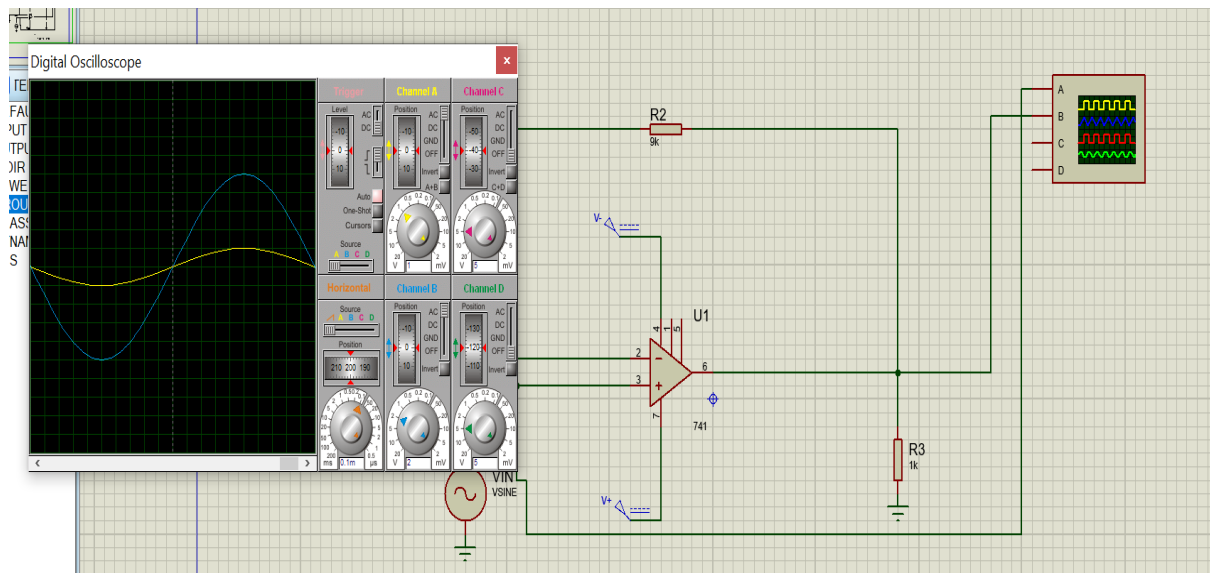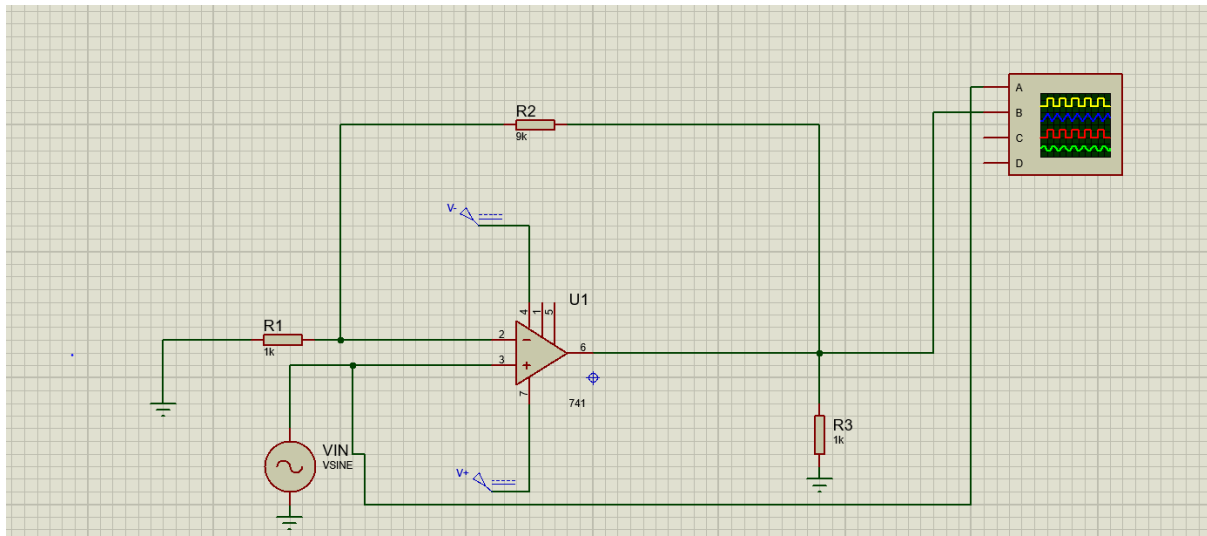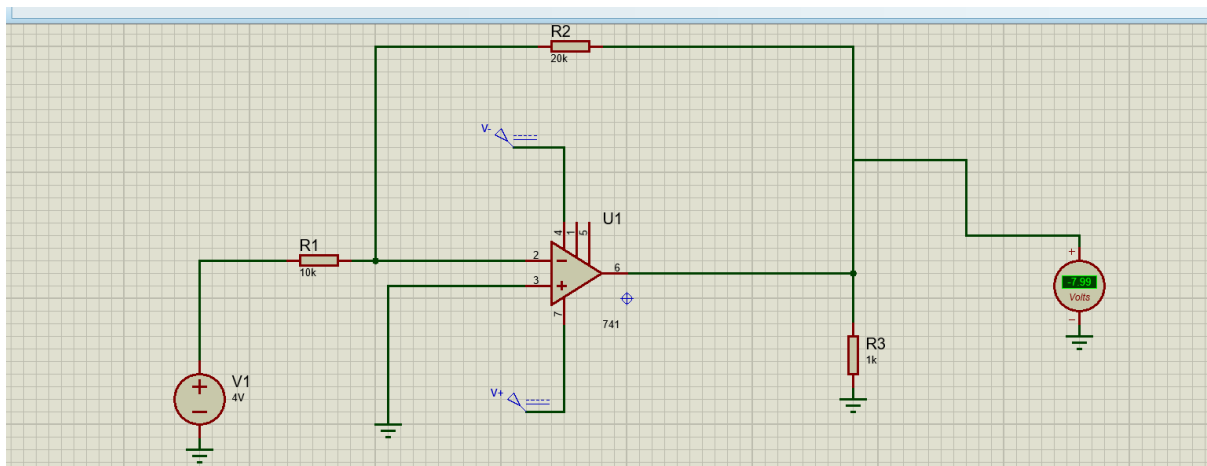
1.A Inverting Amplifier: AC Input Voltage
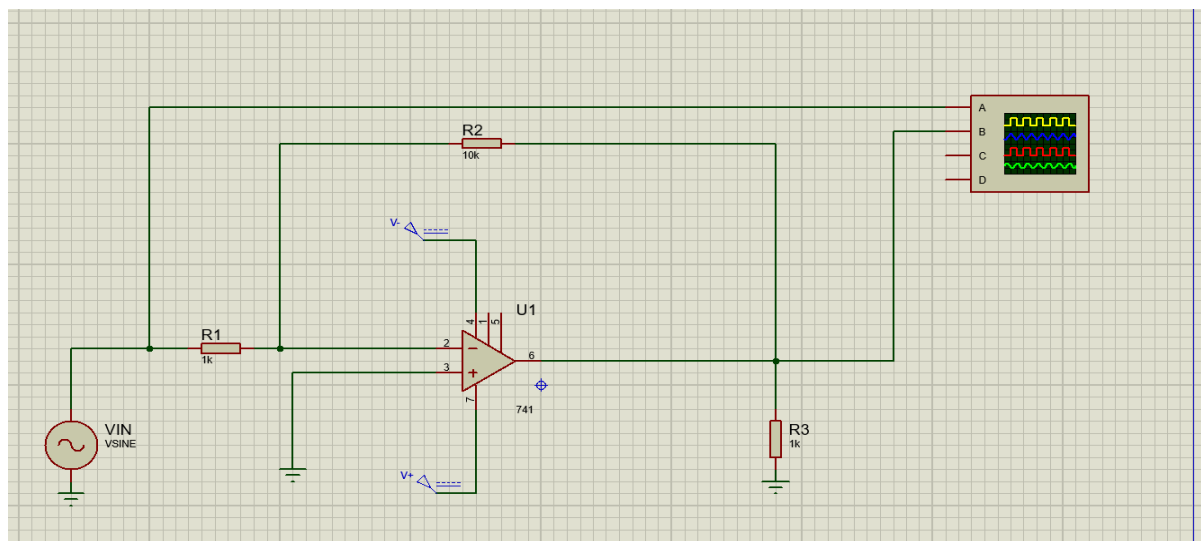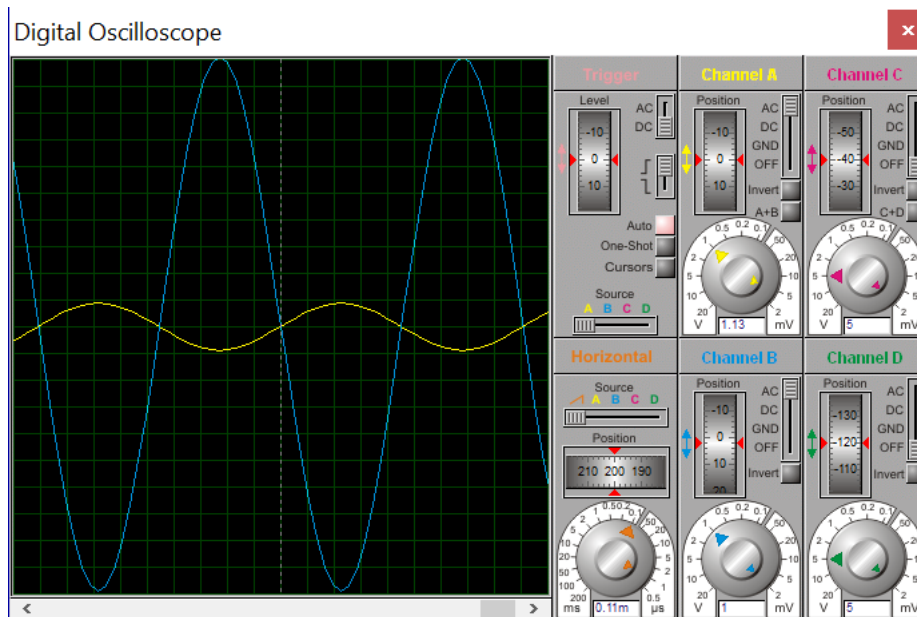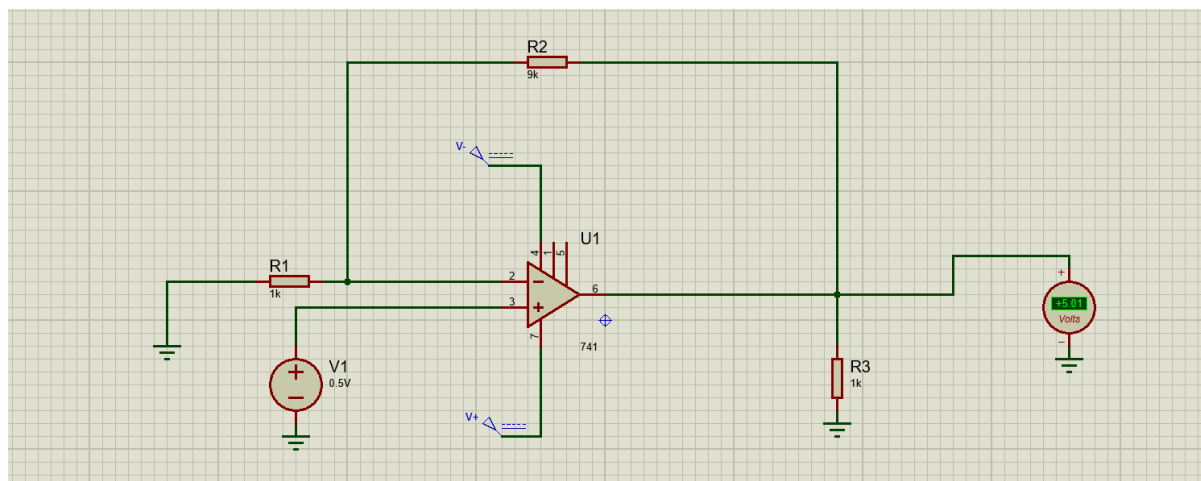
1.B Non-Inverting Amplifier: AC Input Voltage

2.A Inverting Amplifier: DC Input Voltage

2.B Non-Inverting Amplifier: DC Input Voltage

Observation Table:

1.A Inverting Amplifier: AC Input Voltage

Sr.No.	Frequency(Hz)	V_{in}(p-p)(V)	V_{out}(p-p)(V)	Practical Gain: V_{out} / V_{in}	Theoretical Gain: -RF / R1
1.	1000 Hz	1 Vp-p	-10 Vp-p	-10	-10
2.	1000 Hz	2 Vp-p	-20 Vp-p	-10	-10
3.	1000 Hz	4 Vp-p	-8 Vp-p	-2	-2

1.B Non-Inverting Amplifier: AC Input Voltage

Sr.No.	Frequency(Hz)	V_{in}(p-p)(V)	V_{out}(p-p)(V)	Practical Gain: V_{out} / V_{in}	Theoretical Gain: 1+ RF / R1
1.	500 Hz	1/2 Vp-p	5.5	11	11
2.	500 Hz	1 Vp-p	11	11	11
3.	1000 Hz	1 Vp-p	11	11	11

2.A Inverting Amplifier: DC Input Voltage

Sr.No.	V_{in}(p-p)(V)	V_{out}(p-p)(V)	Practical Gain: V_{out} / V_{in}	Theoretical Gain: -RF / R1
1.	1 Vp-p	-9.99	-9.99	-10
2.	2 Vp-p	-9.99	-4.995	-5

3.	4 Vp-p	-8	-2	-2

2.B Non-Inverting Amplifier: DC Input Voltage

Sr.No.	V_{in}(p-p)(V)	V_{out}(p-p)(V)	Practical Gain: V_{out} / V_{in}	Theoretical Gain: $1 + RF / R1$
1.	1/2 Vp-p	5.51	11.02	11
2.	1 Vp-p	11	11	11
3.	1 Vp-p	11	11	11

Post Lab Questions:

Experiment 9: Inverting and Non-Inverting Amplifier using OPAMP.

Q1) List the characteristics of Ideal operational amplifier.

An ideal operational amplifier is usually considered to have the following characteristics:

- Infinite open-loop gain $G = V_{out}/V_{in}$
- Infinite input impedance R_{in}, and so zero input current.
- zero input offset voltage
- Infinite output voltage range
- zero noise
- zero output impedance R_{out}, and so infinite output current range.

Q2) List the important parameters of IC741 operational amplifier.

The important parameters of IC741 along with their values are as listed below:

- Differential input Resistance : $2M\Omega$
- Input capacitance : $1-4pF$
- Output resistance : 75Ω
- Input voltage Range : ±12 to ±13 V
- Power consumption : $85mW$
- Open loop voltage Gain : $200,000$
- Output voltage swing : $\pm13V$ to $\pm15V$
- CMRR : $90dB$