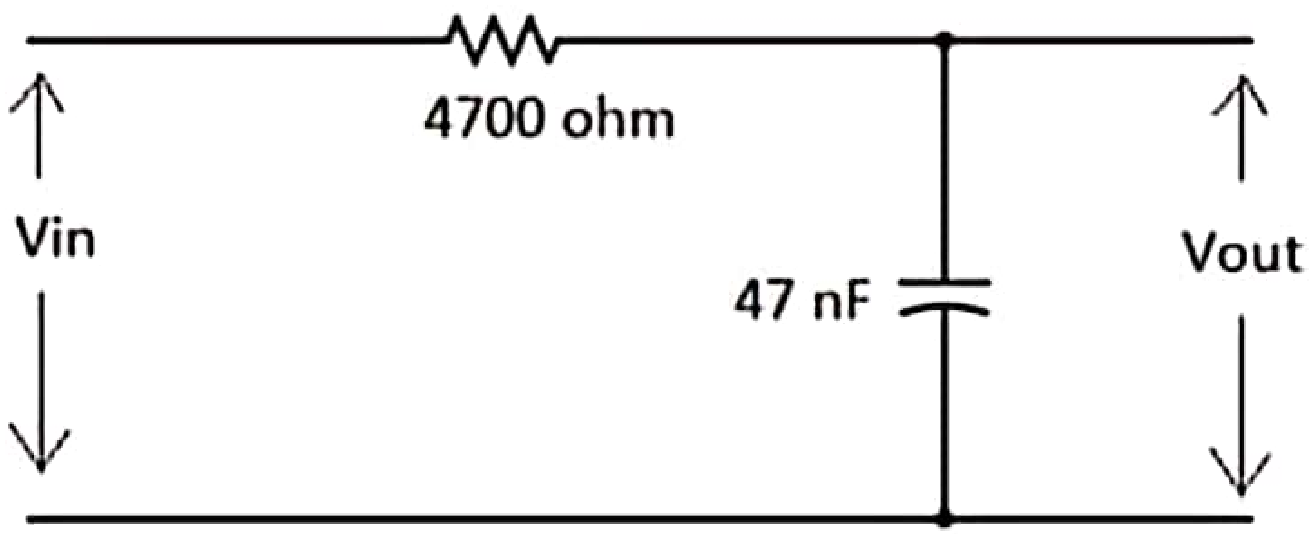
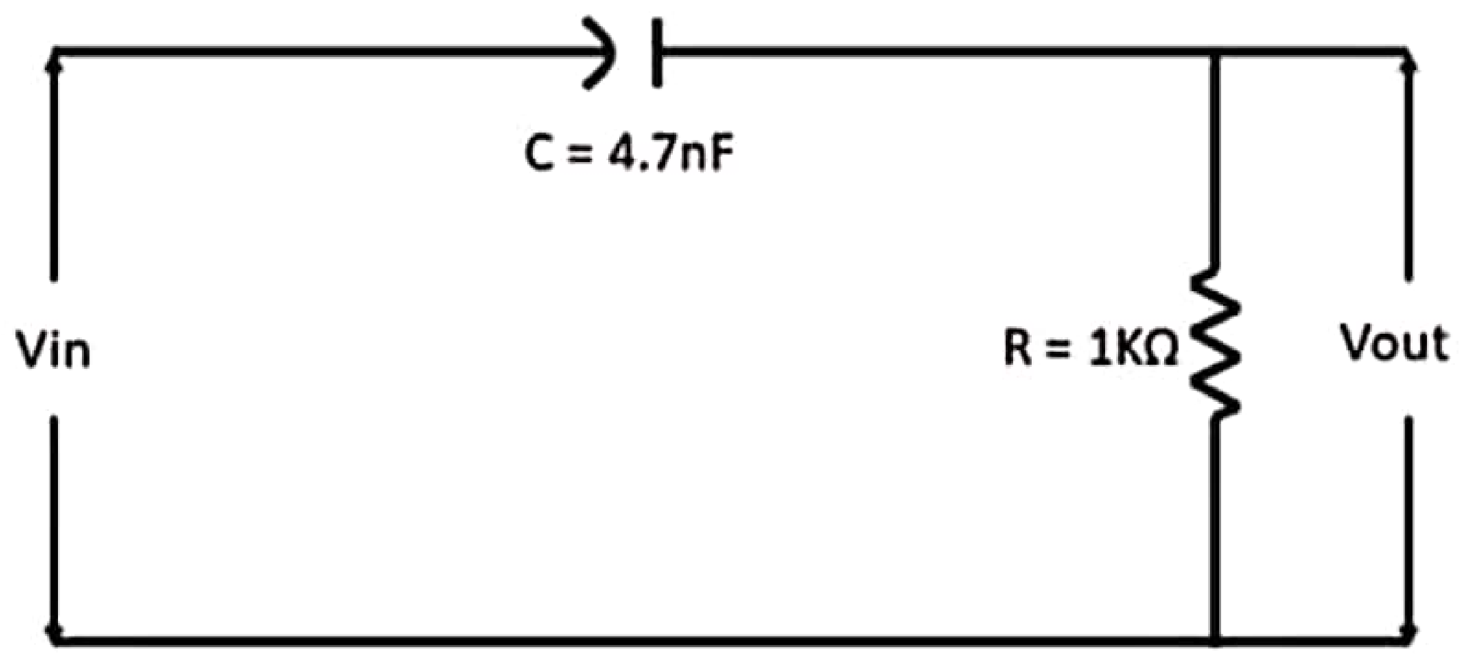
Experiment No. 1

Design a CR filter given below. Apply a sinusoidal signal at the input of 2 Vp-p. Vary the frequency in appropriate steps by keeping the amplitude of input signal fixed. Plot the gain vs. frequency graph. Determine the type of filter. Find the 3 dB cut-off frequency from the graph and compare it with the theoretical cut-off frequency.



Experiment No. 2

Design a CR filter given below. Apply a sinusoidal signal at the input of 2 Vp-p. Vary the frequency in appropriate steps by keeping the amplitude of input signal fixed. Plot the gain vs. frequency graph. Determine the type of filter. Find the 3 dB cut-off frequency from the graph and compare it with the theoretical cut-off frequency.

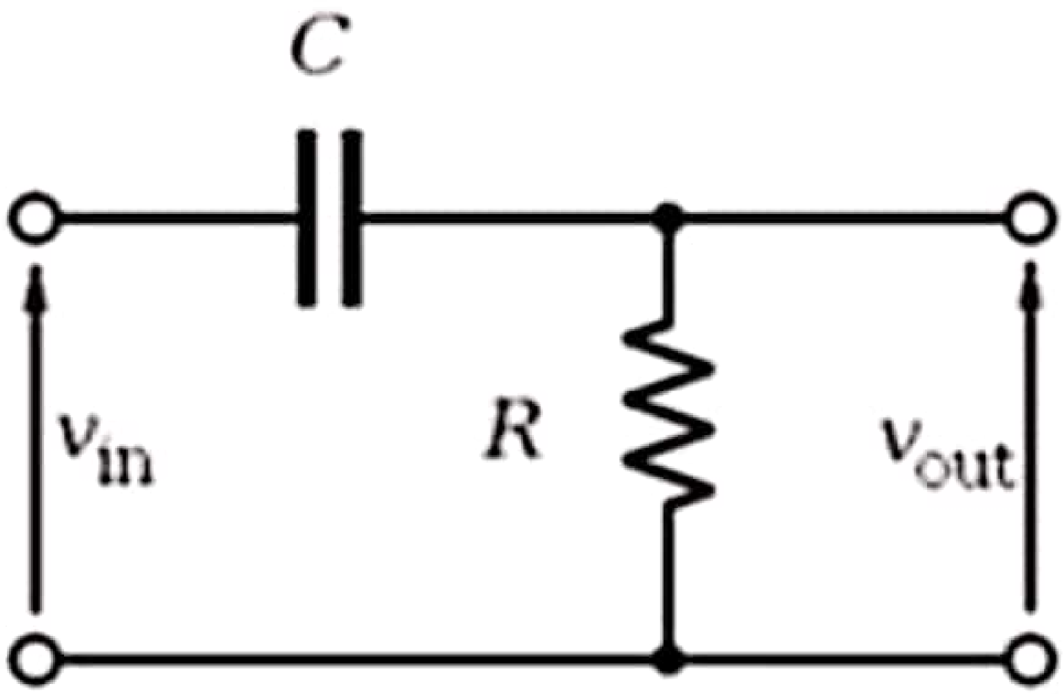


Experiment No. 3

Design the CR differentiator circuits having C and R values stated below.

C1=5 μF, C2=2.5 μF,C3=100 nF and R1=1kΩ, R2=2kΩ, R3=22kΩ.

Allow a square wave signal having peak to peak voltage of 9V and frequency of 200 Hz through all the circuits. Go for a comparative study and comment on the nature of output waveforms of all the circuits.



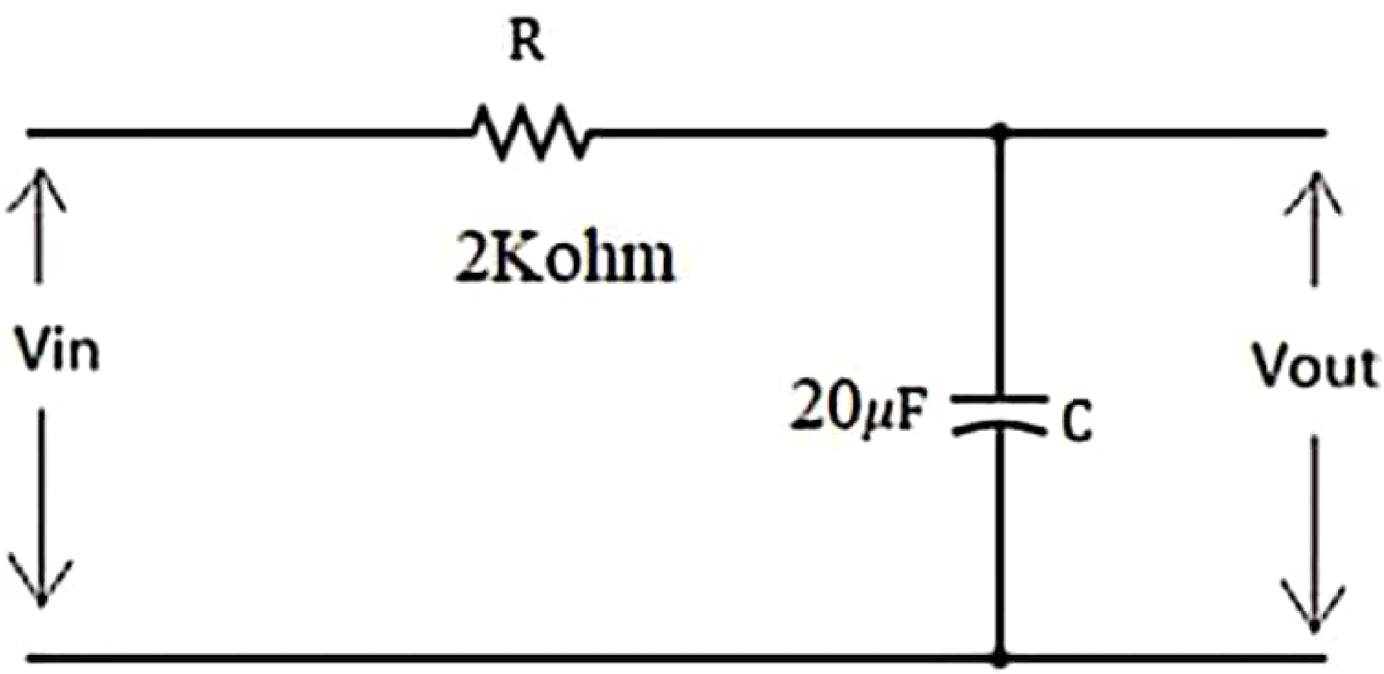
Experiment No. 4

Apply square wave input of 1.2V pp to the circuit as shown in the figure. Mention the range of input pulse width so that the circuit behaves as integrator.

Choose one among the mentioned pulse width range of square input wave and simulate the circuit. Show the corresponding input and output waveform over time axis.

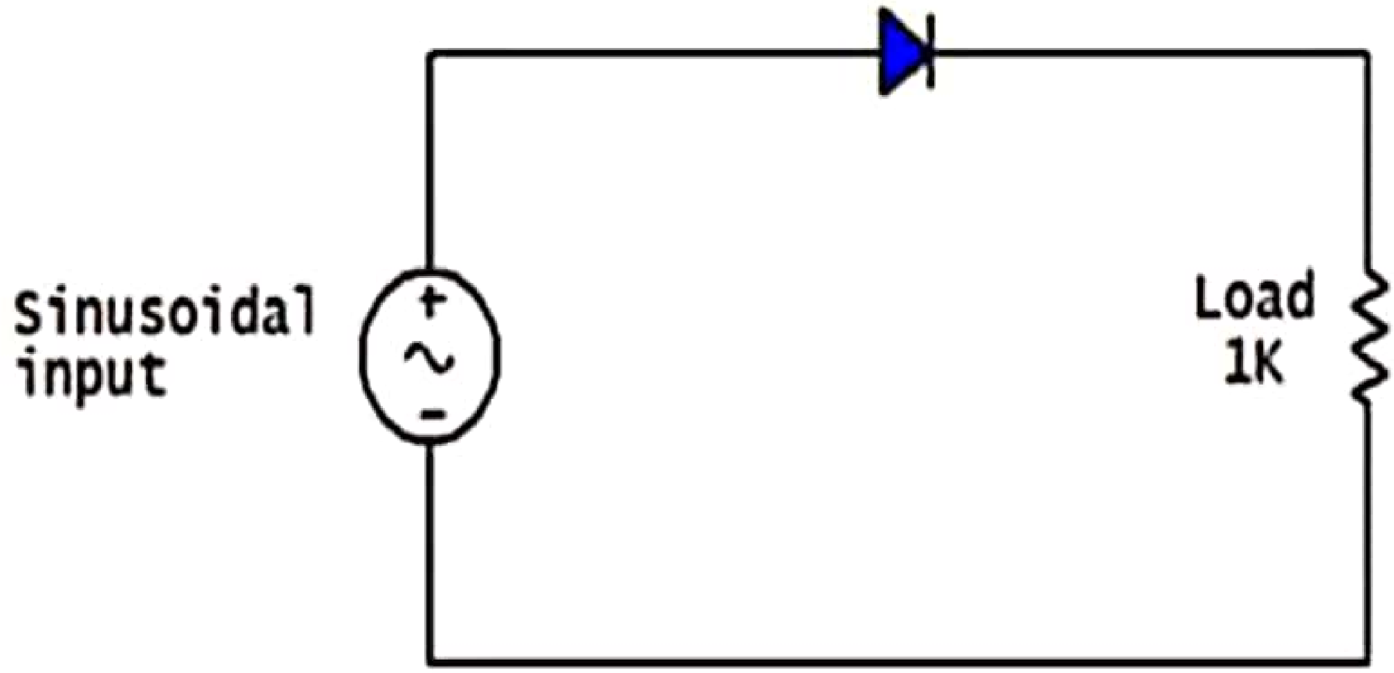
Measure the amplitude and pulse repetition frequency of input waveform and peak to peak voltage of output waveform.

Compare the observed rise time with the theoretical one.



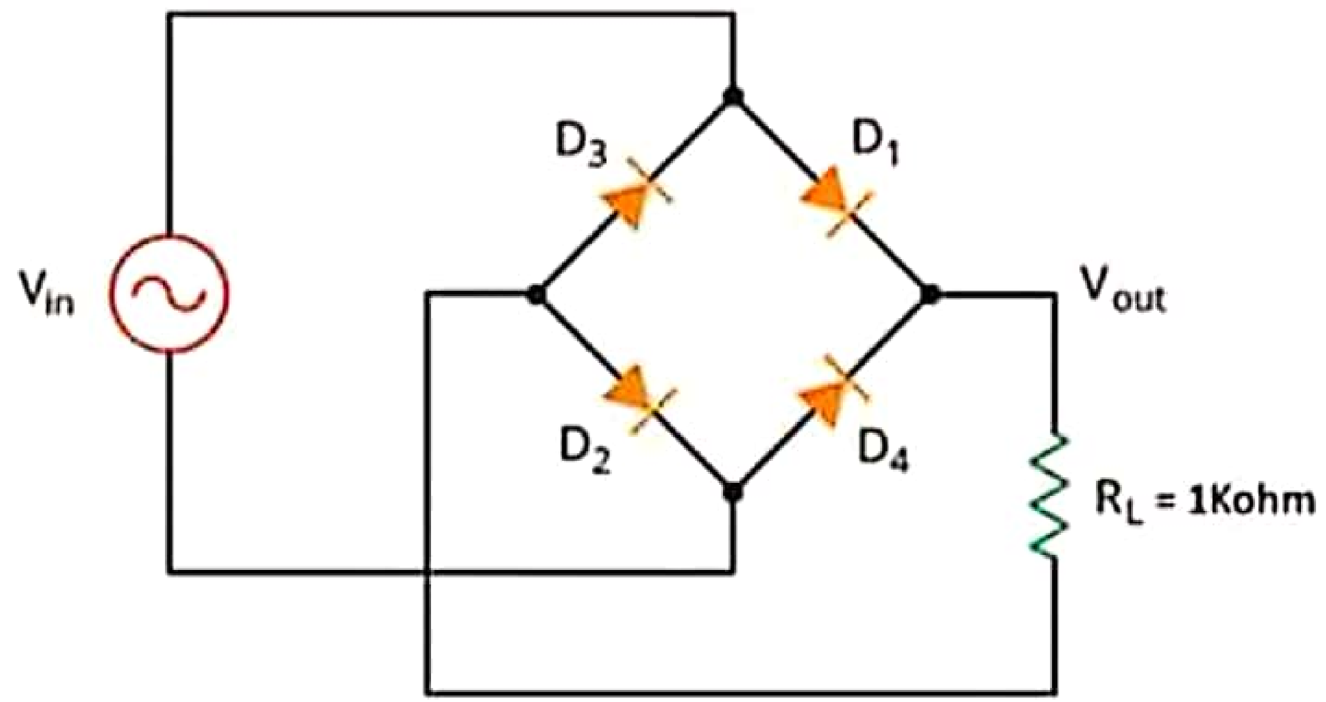
Experiment No. 5

Design a Half wave rectifier circuit and plot the sinusoidal input and rectified output waveforms. Calculate V_{RMS}, V_{DC} and Ripple factor of the circuit.



Experiment No. 6

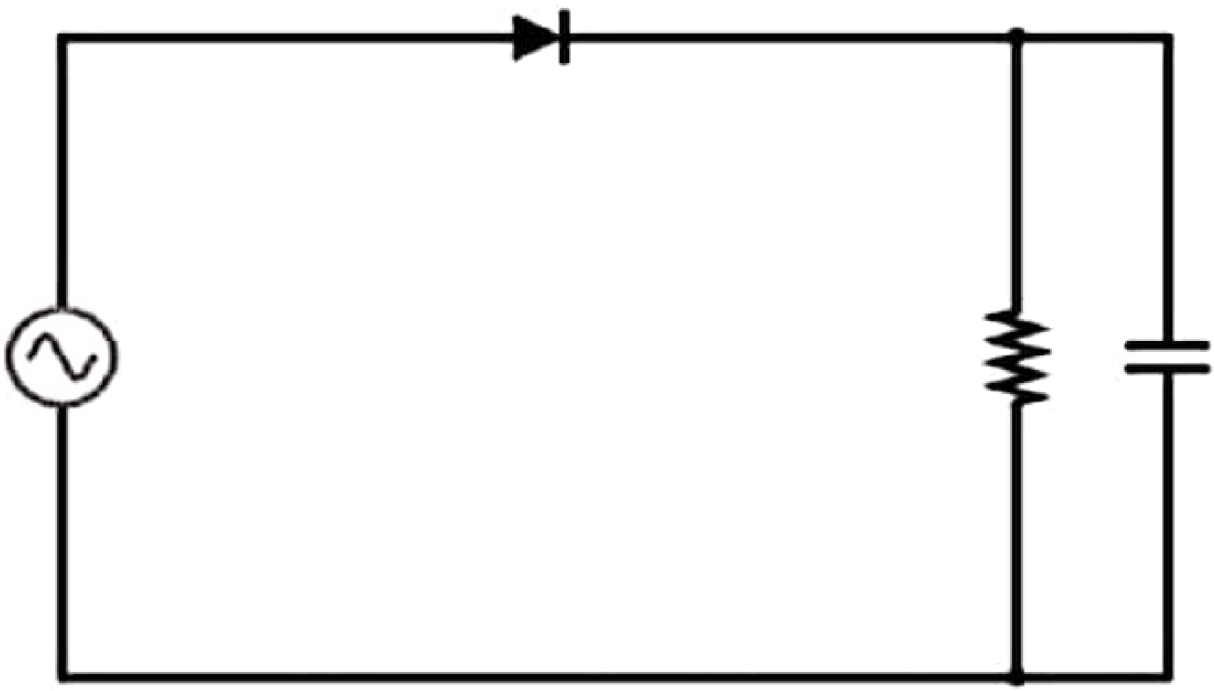
Design a Full wave rectifier circuit with Vin = 2 Vp-p and 1 KHz sine wave. Change the value of R_L = 700 ohm and 1 Kohm. Observe and plot the sinusoidal input and rectified output waveforms. Explain the role of diodes and resistor and their effect on applied input sine wave. Calculate V_{RMS}, V_{DC} and Ripple factor of the circuit for each value of resistor.



Experiment No. 7

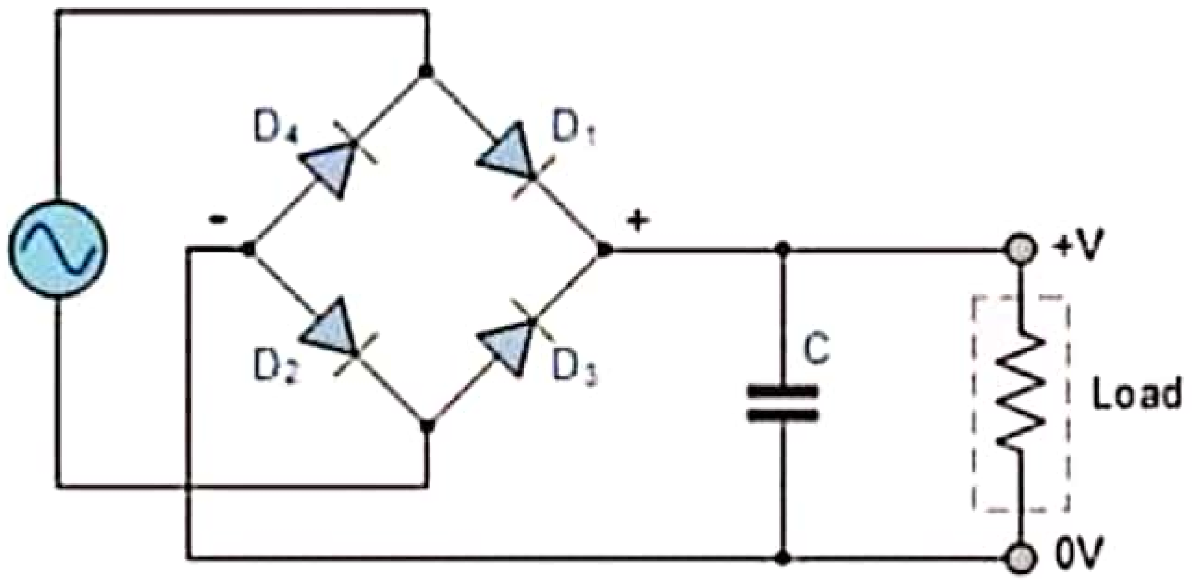
Design a half wave rectifier with a capacitor. Change the values of the capacitor and observe the RMS voltage of the output (Take 5 readings). Also explain the role of the capacitor in this circuit.

R= 2Kohm, C=4.7uF, Vin=sine wave with 5V max.



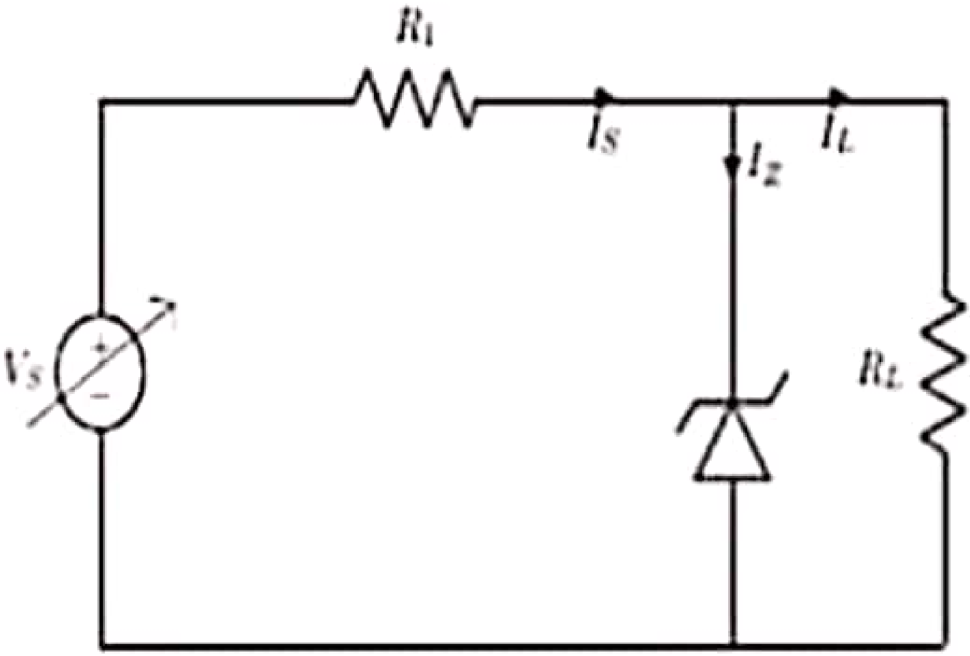
Experiment No. 8

Design a full wave rectifier with a capacitor. R_L=2k ohm, C=4.7uF, Vin=sine wave with 5V max. Draw the output waveform. Explain the role of the capacitor in this circuit Calculate the ripple factor for the given values of R_L and C.



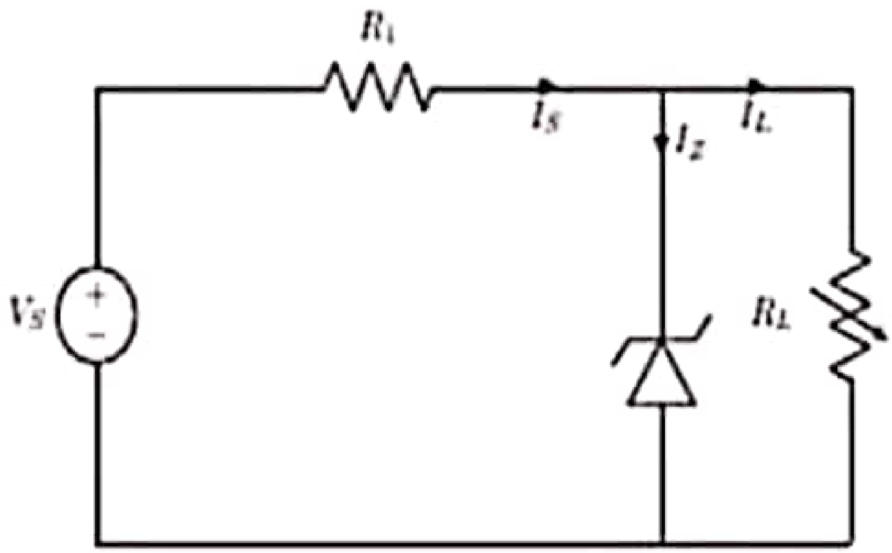
Experiment No. 9

Perform the experiment to study Zener diode Line regulation. Consider R1=1kΩ, Rl=2kΩ, Vz=5volt. Vary the dc voltage say Vs(0-20) volt , tabulate the corresponding values of load current, zener current, output voltage and voltage regulation. Plot it.



Experiment No. 10

Perform the experiment to study Zener diode load regulation. Consider Vs=6 volt,R1=100Ω, Vz=5volt.Vary the load Resistance, tabulate the corresponding values of load current, zener current, output voltage and voltage regulation. Plot it.

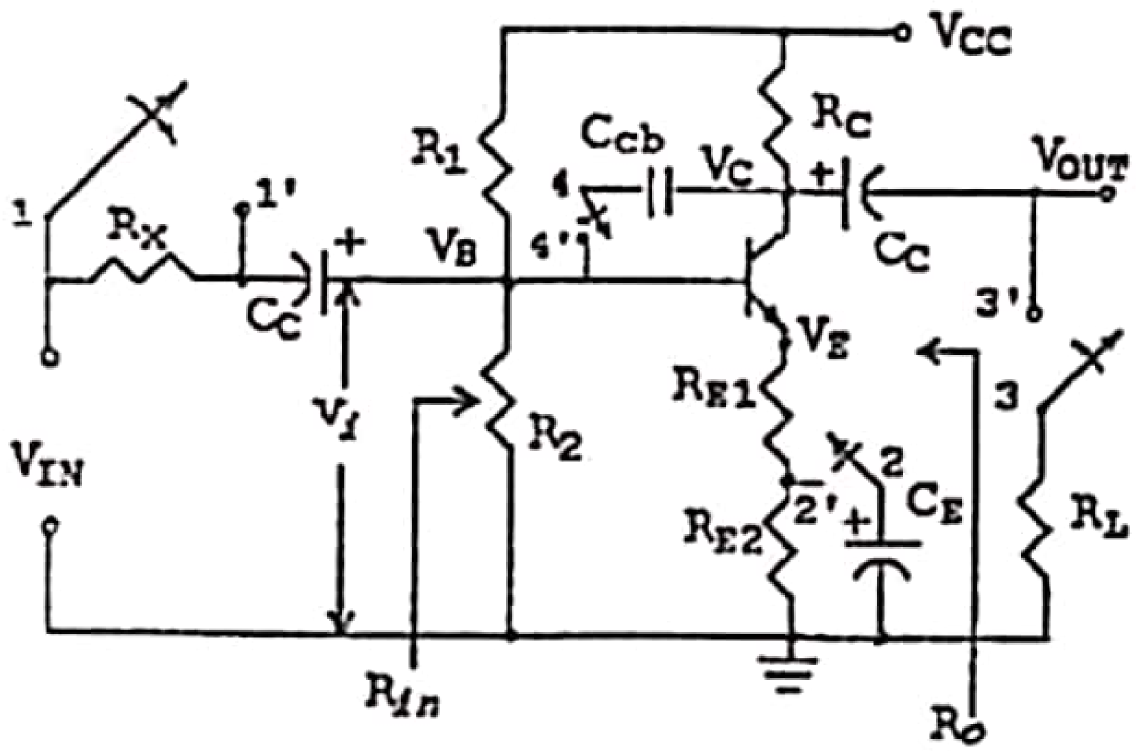


Experiment No. 11

Calculate the signal handling capacity (V_{SM}) of the following CE amplifier: Given, $R_1 = 47k\Omega$, $R_2 = 4.7k\Omega$, $R_C = 6.8k\Omega$, $R_{E1} = 0.33k\Omega$, $R_{E2} = 0.33k\Omega$, $R_X = 1k\Omega$, $V_{IN} = 100mV$, $f = 4$ KHz, $R_L = 1k\Omega$, $C_C = 10\mu F$, $C_E = 100\mu F$ and $C_{cb} = 33pF$. Measure the V_{SM} (i) without R_L and (ii) with R_L. *(Use **Falstad / LT spice**)*

Assume:

- R_{E2} is fully bypassed.
- R_X is shorted.
- Miller capacitor (C_{cb}) is disconnected.

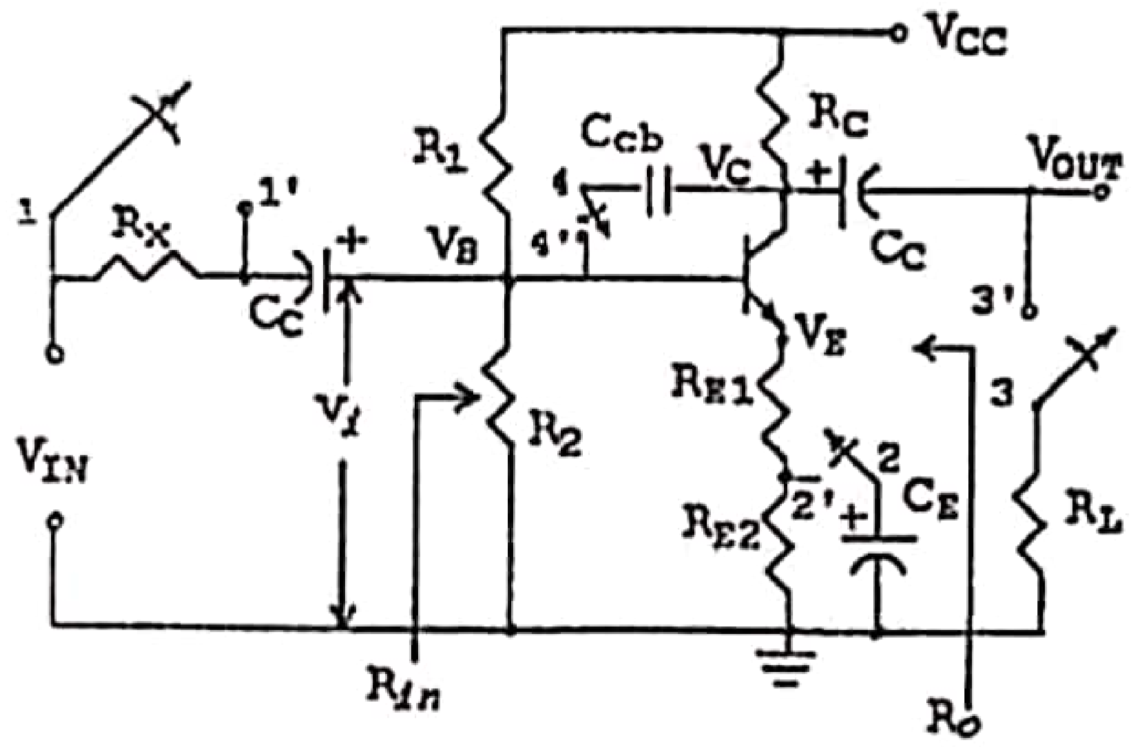


Experiment No. 12:

Verify the DC conditions of the following CE amplifier: Given, $V_{CC} = 12V$, $R_1 = 47k\Omega$, $R_2 = 4.7k\Omega$, $R_C = 5k\Omega$, $R_{E1} = 200\Omega$, $R_{E2} = 200\Omega$, $R_X = 1k\Omega$, $V_{IN} = 100mV$, $f = 4$ KHz, $R_L = 1K\Omega$, $C_C = 10mF$, $C_E = 100mF$ and $C_{cb} = 33pF$. Measure the value of V_C, V_E, V_B, V_{CE}, V_{BE}, I_B, and I_C ***(Use Falstad / LT spice).***

Assume:

- AC voltage source is shorted
- All capacitors are open circuited



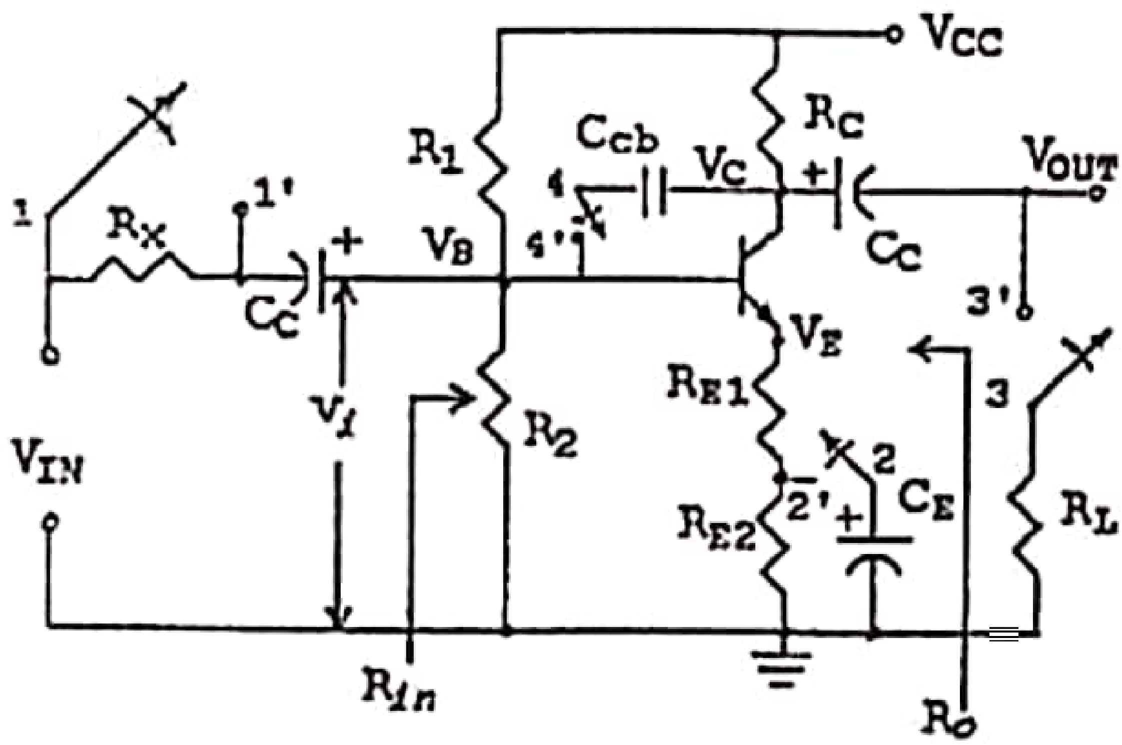
Experiment No. 13

Plot the frequency response of the following practical CE amplifier *(Use **Falstad** / **LT spice**)*.

Given: $R_1 = 47k\Omega$, $R_2 = 4.7k\Omega$, $R_C = 6.8k\Omega$, $R_{E1} = 0.33k\Omega$, $R_{E2} = 0.33k\Omega$, $R_X = 1k\Omega$, $R_L = 1k\Omega$, $C_C = 10\mu F$ and $C_E = 100\mu F$.

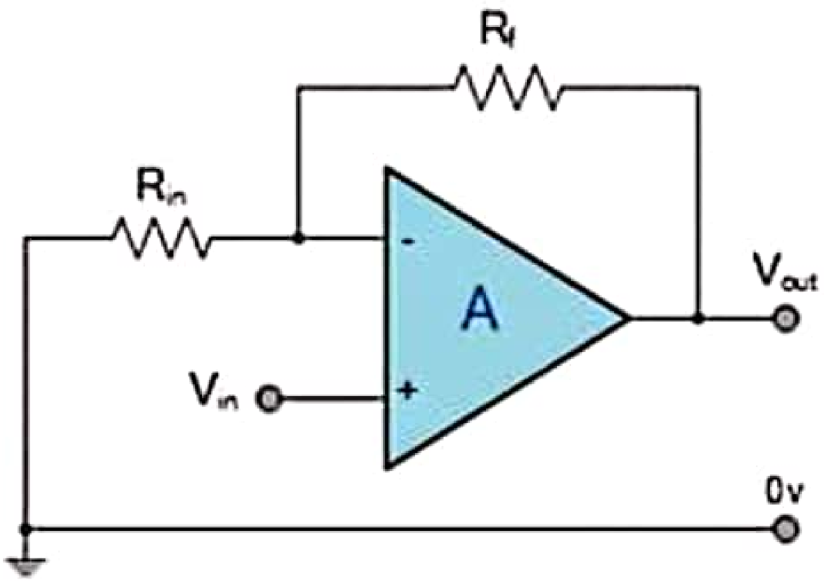
Assume:

- $V_{IN} = 100mV$ and $f_{in} = 4$ KHz
- R_{E2} is fully bypassed
- R_X is shorted
- Miller capacitor (C_{cb}) is disconnected
- Power supply, $V_{CC} = +12$ V



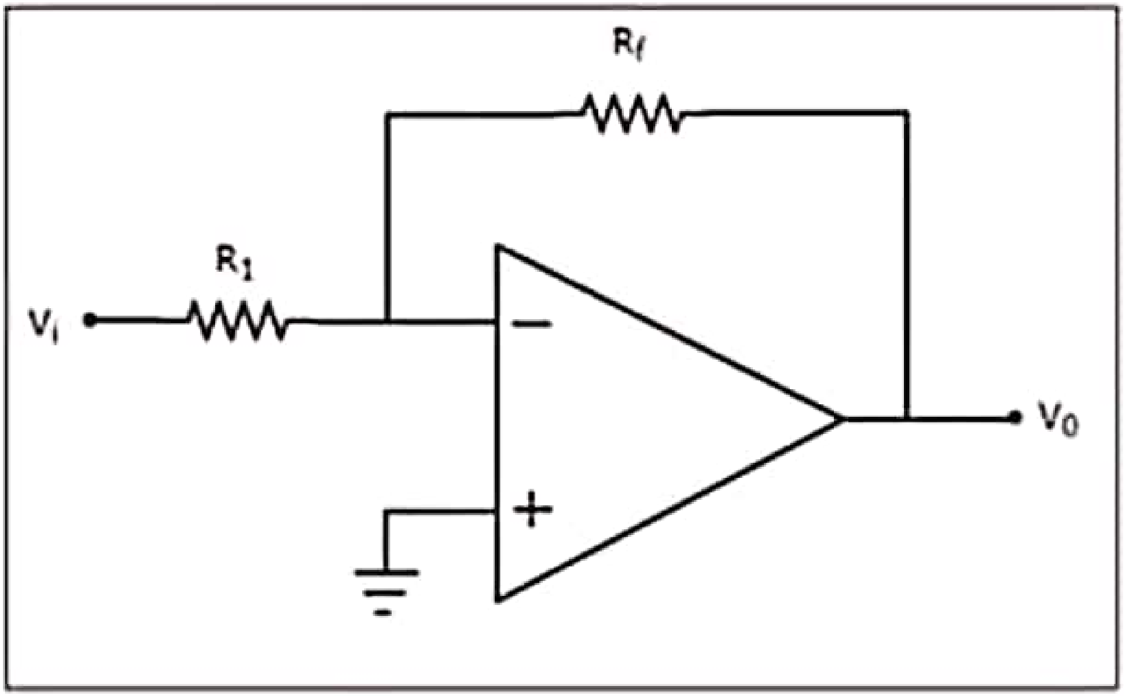
Experiment No. 14:

Realize an Amplifier using Op Amp (V max = 15V and V min = -15V) that has a gain of +3. First, find out the required value for Rf if Rin = 10kOhms. Then, draw the circuit and take a sinusoidal input voltage source at 50Hz. Vary its amplitude from 0V to 5V. For each value, note the output voltages. Plot these values and verify the gain.



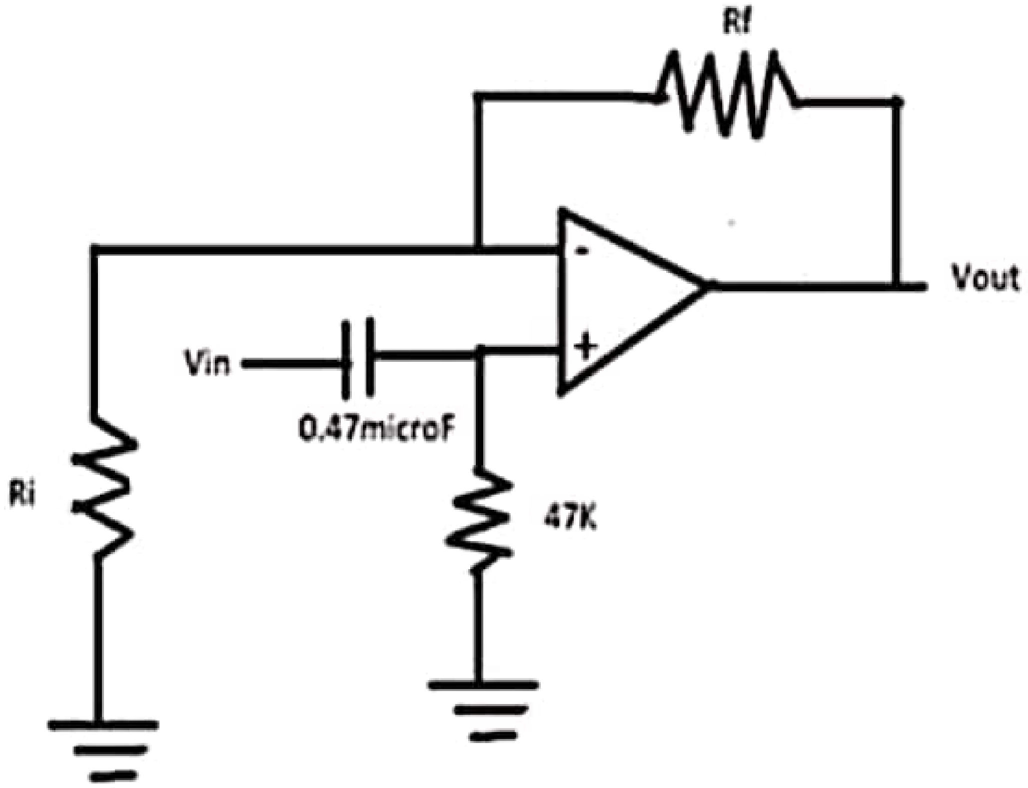
Experiment No. 15:

You have to realize an Amplifier using Op Amp(V_{max} = 15V and V_{min} = -15V) that has a gain of -3. First, find out the required value for R_f if R_1 = 2kOhms. Then, draw the circuit and take a sinusoidal input voltage source at 40Hz. Vary its amplitude from 0V to 5V. For each value, note the output voltages. Plot these values and verify the gain.



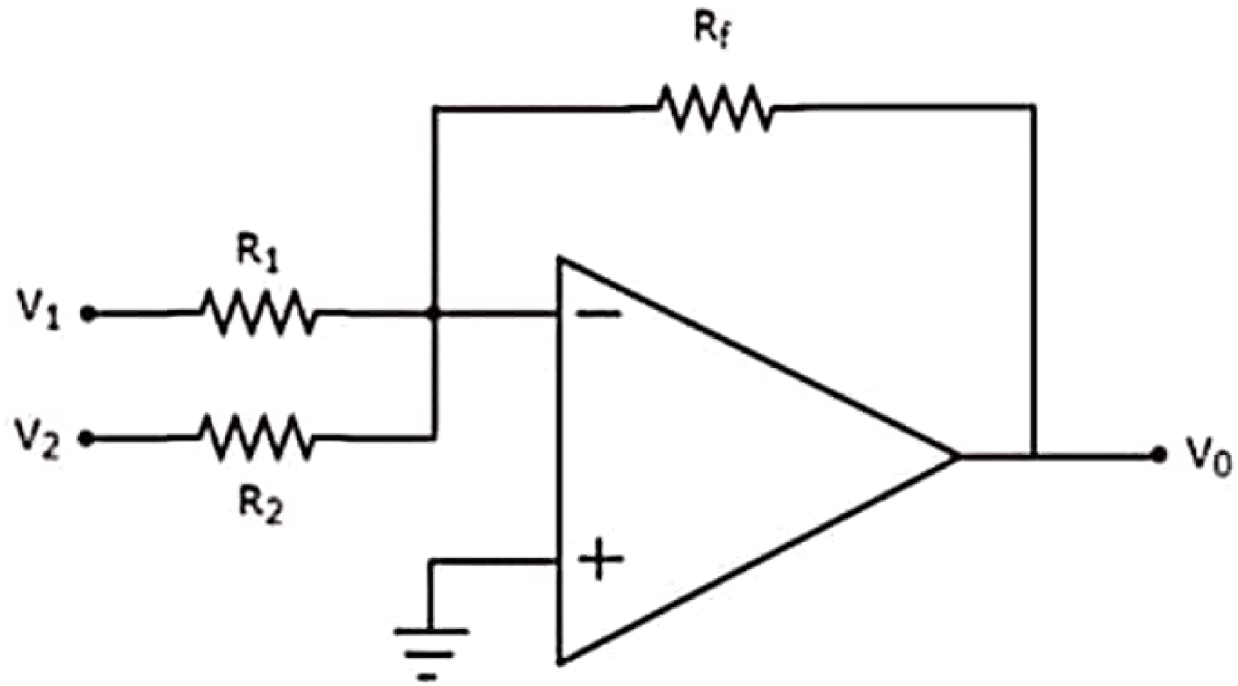
Experiment No. 16:

Find the frequency response of non-inverting amplifier using Op-Amp with Ri=10KΩ and Rf=47 KΩ. Determine the Bandwidth. Use LTspice or Falstad to do this experiment. Note down Vout and corresponding frequency and Gain (dB) in a tabular form.



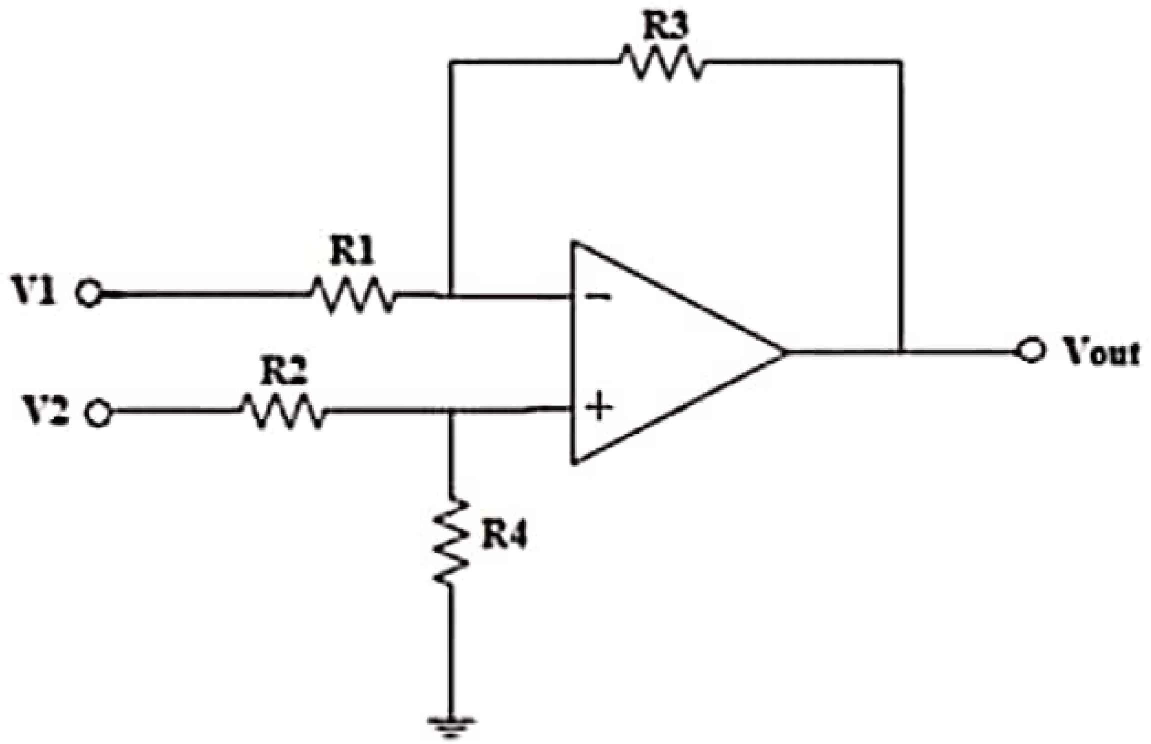
Experiment No. 17:

Realize Adder using Op Amp as shown in the figure below. Use Falstad or LTspice to do this experiment. Choose R_1 = 10 KΩ, R_2 = 10 KΩ, R_f = 10 KΩ. Apply V_1 = 5 V and V_2 = 10 V dc. Measure V_o and compare it with the theory.



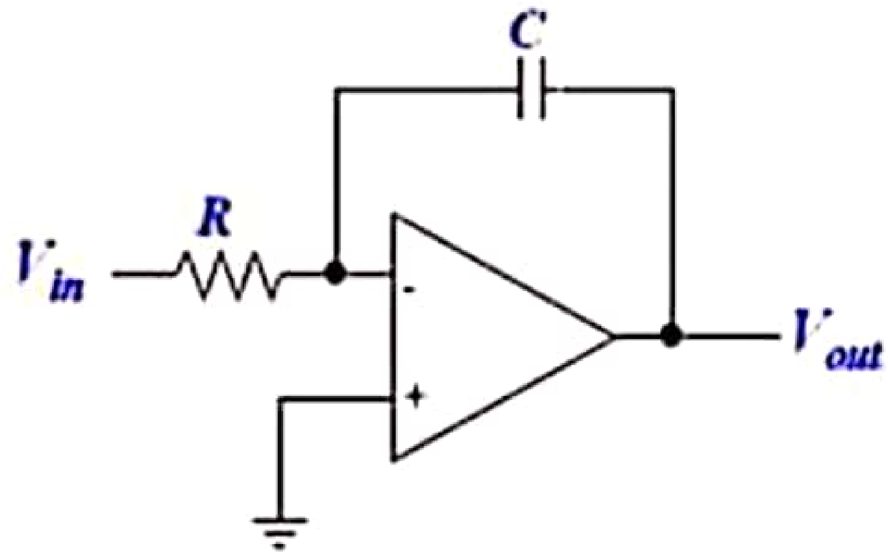
Experiment 18:

Realize the **Differential Amplifier using Op Amp** as shown in the figure below. Use **LTspice or Falstad** to do this experiment. Choose $R_1 = 10\ K\Omega$, $R_2 = 10\ K\Omega$, $R_3 = 47\ K\Omega$ and $R_4 = 47\ K\Omega$. Apply $V_1 = 2$ V and $V_2 = 3$ V dc. Measure V_{out} and compare the measured V_{out} with theory.



Experiment No. 19:

Design and simulate an integrator circuit using Op-Amp: Given, R= 10KΩ and C=0.1uF. Plot V_{out} for (i) V_{in} = square wave and (ii) V_{in} = sine wave



Experiment No. 20:

Design and simulate a differentiator circuit using Op-Amp: Given, R= 5KΩ and C=0.5uF. Plot V_{out} for (i) V_{in} = square wave and (ii) V_{in} = sine wave