NARULA INSTITUTE OF TECHNOLOGY

81, Nilgunj Road, Agarpara Kolkata
Department of Electrical Engineering.

Project of:- Basic Electronics Engineering
Topic:- Adder Operational Amplifiers

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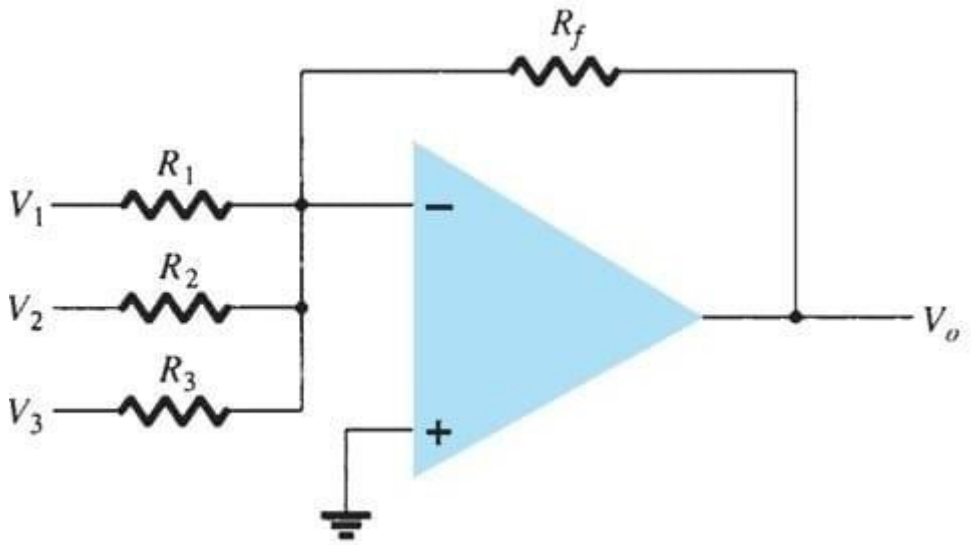
Title:- Design An Adder Circuit To Realise Following Expression

Introduction to the topic:-

An op-amp based adder produces an **output equal to the sum of the input voltages applied at its inverting terminal**. It is also called as a summing amplifier, since the output is an amplified one. In the above circuit, the non-inverting input terminal of the op-amp is connected to ground.



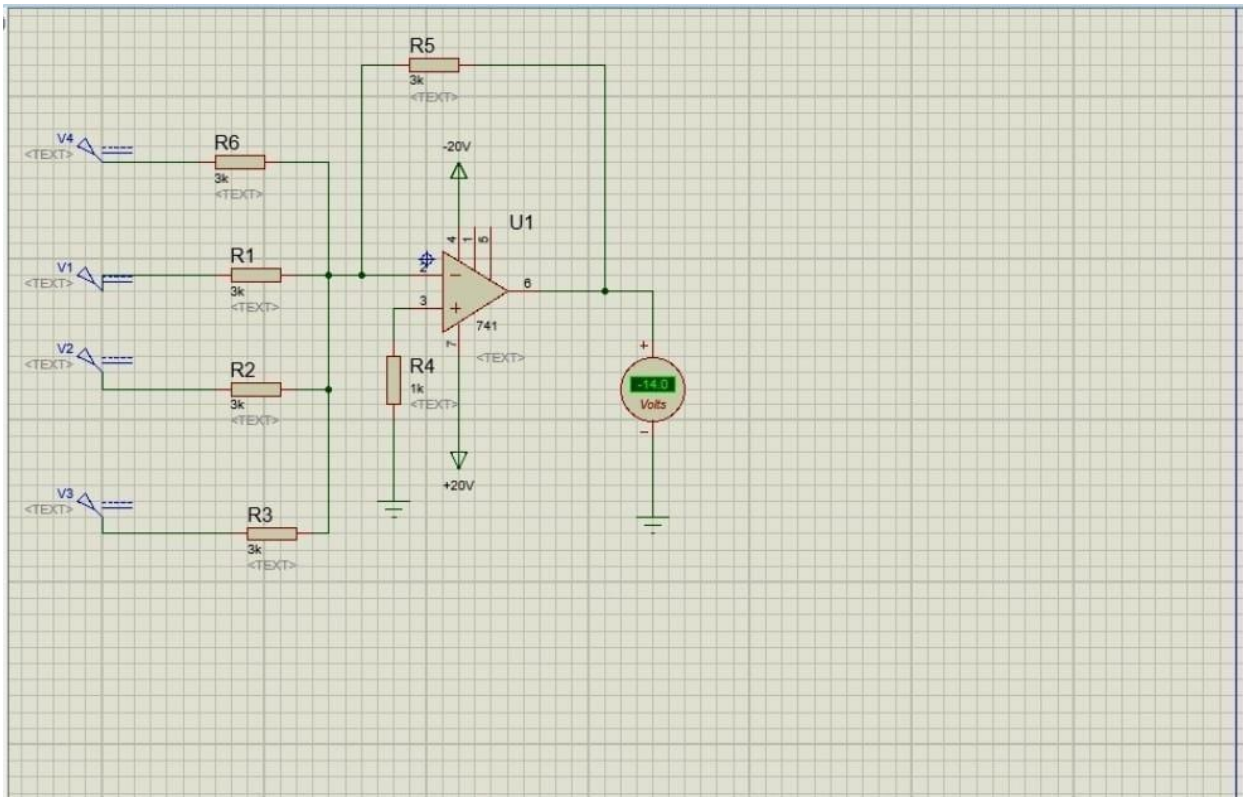
$$V_o = -\left(\frac{R_f}{R_1}V_1 + \frac{R_f}{R_2}V_2 + \frac{R_f}{R_3}V_3\right)$$

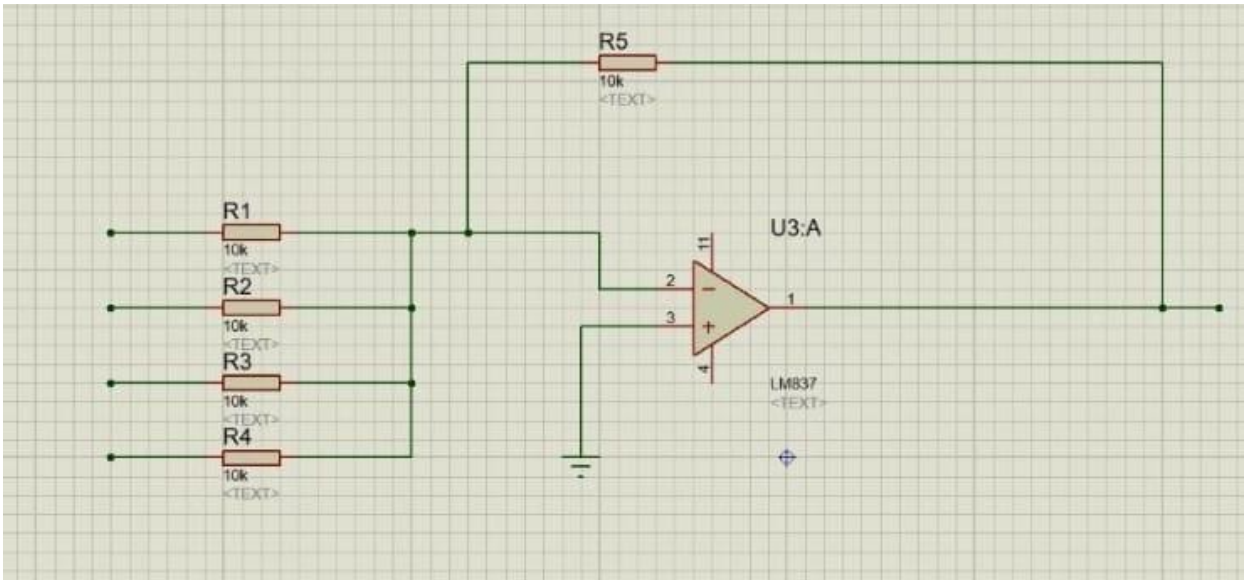
Components required:-

1. Operational Amplifiers
2. Resistor
3. Power supply (for opamp +Vcc & -Vcc)

Software used:- Proteus.

Circuit diagrams:-





Calcuiation:-

$V_{out} = 3V_1 - 5V_2 + 2V_3 - 6V_4$

R1 = -3333.3Ω

R2 = +2000Ω

R3 = -5000Ω

R4 = +1666.67Ω

Precautions:-

1. Circuit connections should be made carefully
2. Ratio of feedback resistance and input resistance should be such that the output voltage is less than the bias voltage to operational amplifier.
3. Measuring instrument should be checked and set into the range of measurement.

Conclusion:-

1. These amplifiers are used in an audio mixer to add different signals with equal gains

2. There are various resistors are used at the input of the summing amplifier to give a weighted sum. This can be used to change a binary number to a voltage in an AC (digital to analog converter)

3. This amplifier is used to apply a DC offset voltage with an AC signal voltage. This process can be done in an LED modulation circuit to maintain the LED in its linear operating range.

References:-

1. Electronics Fundamentals And Application – D. Chattopadhyay & P.C. Rakshit

2. https://www.elprocus.com/summing-amplifier-circuit-with-applications/

3. https://uafulucknow.ac.in/wp-content/uploads/2020/03/Unit-5-Electronics-Operational-Amplifier.pdf

4. 4. Electronic Devices And Circuit Theory –Robert L .Boylestad &Louis Nashelsky.