SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
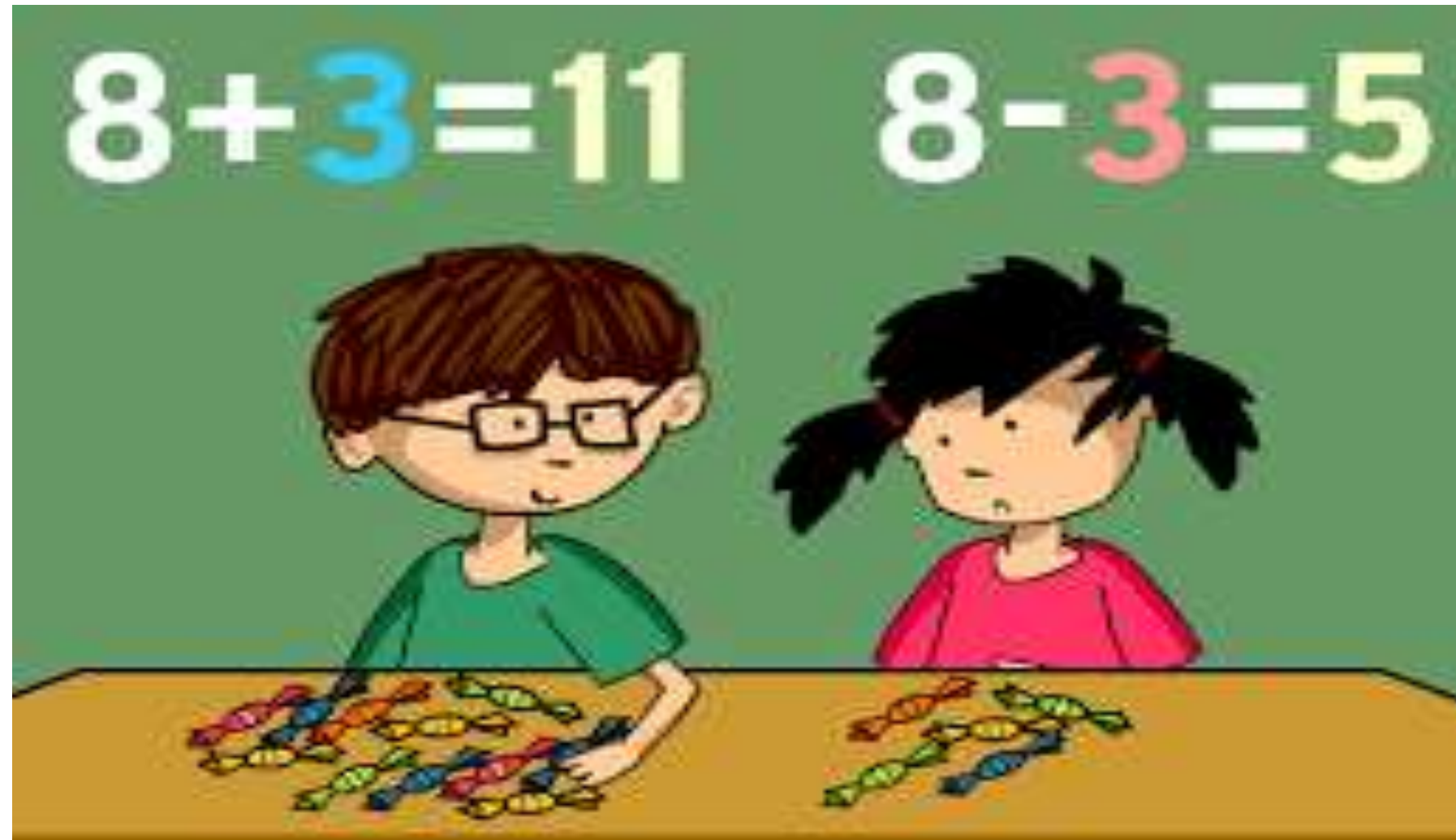
19ECB204 – LINEAR AND DIGITAL CIRCUITS

II YEAR/ III SEMESTER

1

UNIT 1 – **FUNDAMENTALS OF OPAMP**

TOPIC 4 – Adder and Subtractor

Guess?????

Why?

❑In digital circuits, an adder–subtractor is a circuit that is capable of adding or subtracting numbers

❑A circuit that does adding or subtracting depends on a control signal

❑ It is also possible to construct a circuit that performs both addition and subtraction at the same time

❑The Subtract or also called a differential amplifier, uses both the inverting and non-inverting inputs to produce an output signal which is the difference between the two input voltages V1 and V2
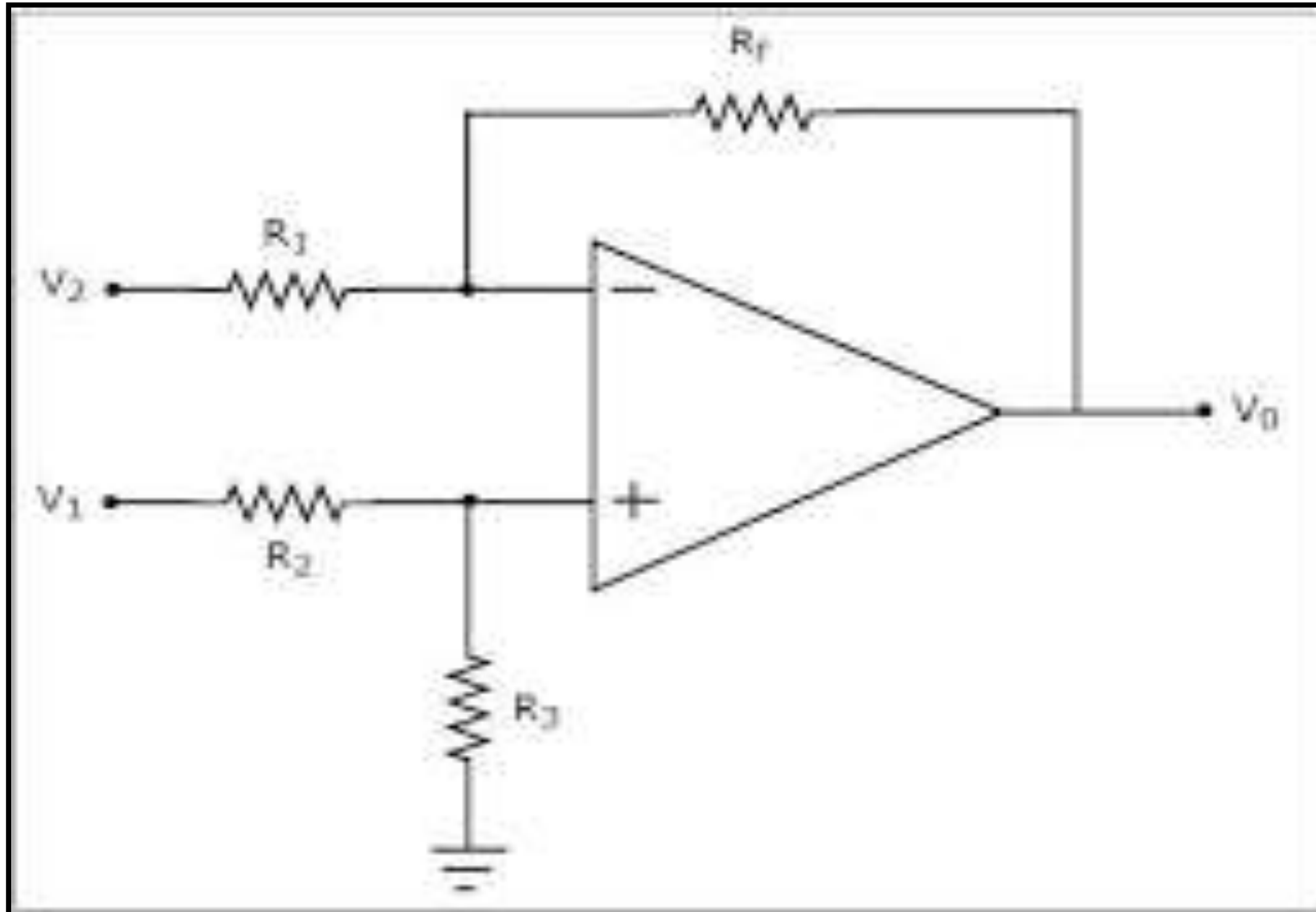
Adder using Op Amp
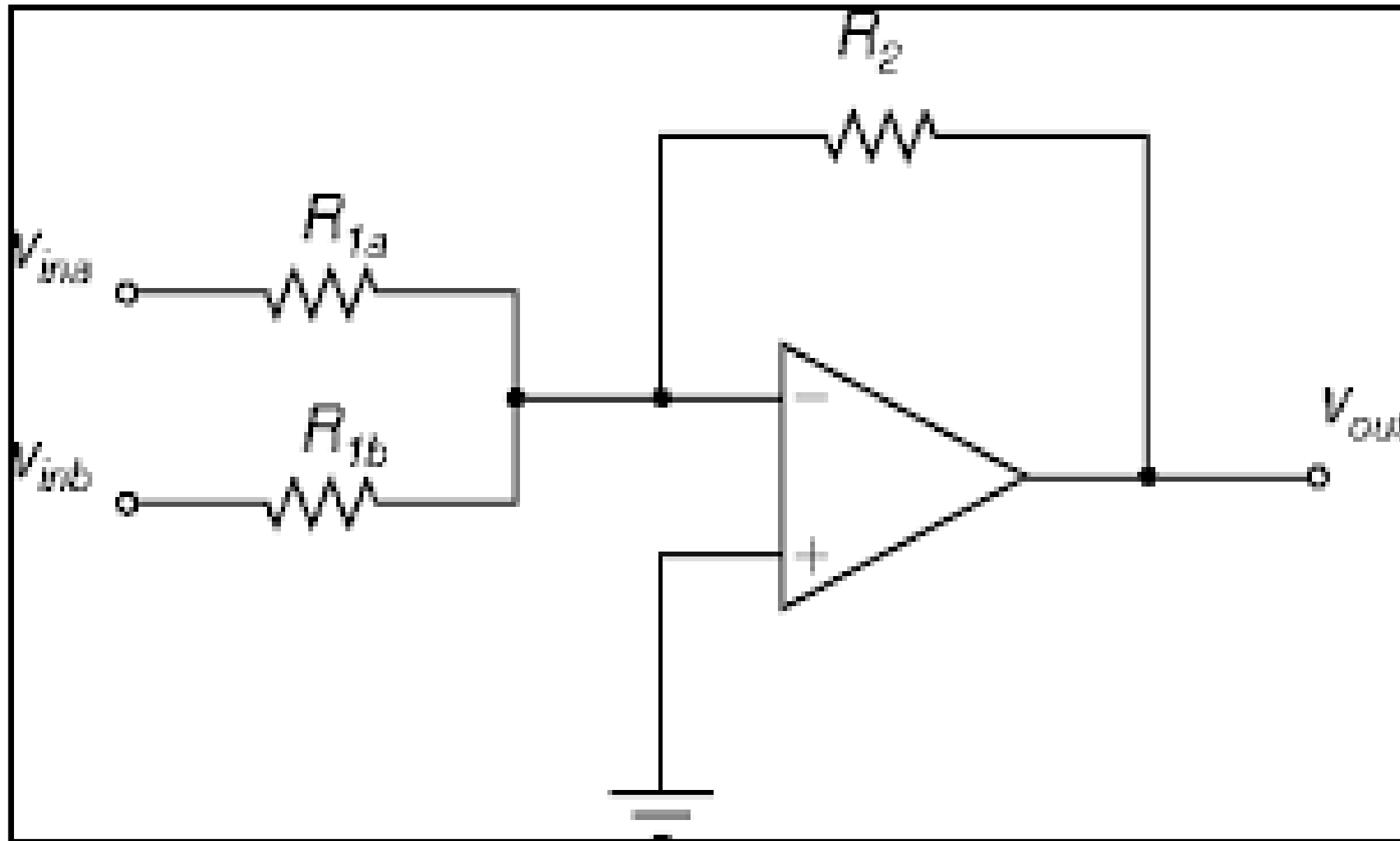
Adder using Op Amp

❑Op-amp is used to design a circuit whose output is the sum of several input signals

❑If the input resistors are equal in value then the summed output voltage is as given and gained +1

❑If the input resistors are unequal in value then the output voltage is weighted sum and becomes

❑ Vout = - (V1(R2/R1a)+V2(R2/R2a)+etc)

Subtractor using Op Amp

Subtractor using Op Amp

❑ Subtractor is used to produce an output signal which is difference between the two input voltages V1, V2 allowing one signal to be subtracted from another

❑If the input resistors are equal in value then the output voltage is gained as +1

❑If the input resistance are unequal then the circuit become a differential amplifier

❑ Output will be, $V_0 = V_1 - V_2$

Activity

In class activity
Students should make the correct shape from the given tangram kit.

Audio Mixer

❑A **mixer** is an electronic device which is often **used for** changing the quality and the levels of **audio** signals

❑ It is also known as a **mixing** console, an **audio mixer**, or a soundboard

❑Using a **mixer** is the most convenient way to route or combine various **audio** signals and even change the timbre and dynamics of the sound

Digital to Analog conversion
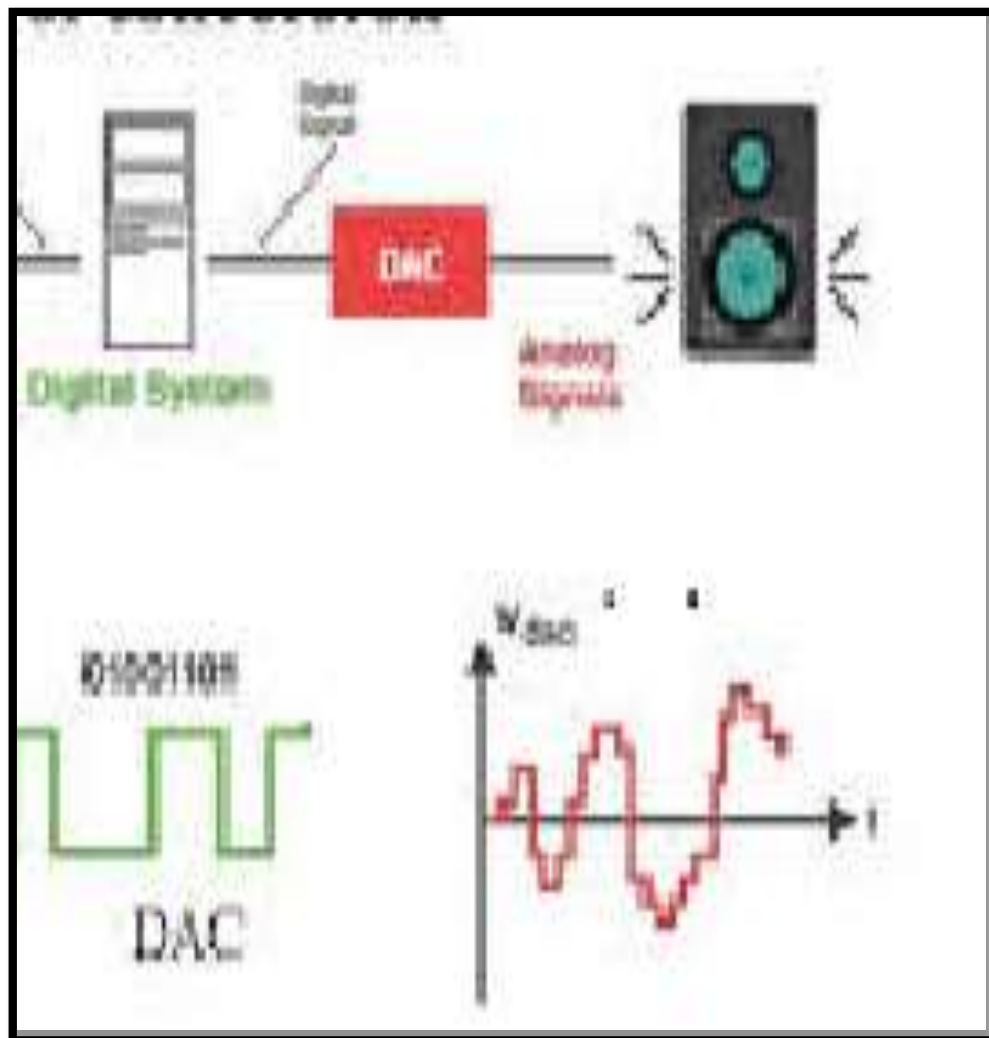
❑In the real world, most data are available in the form of analog in nature.

❑ While manipulating the data, these two converting interfaces are essential to digital electronic equipment

❑DAC will process the digital sound signal back into the analog signal that is used by audio output equipment such as a speaker
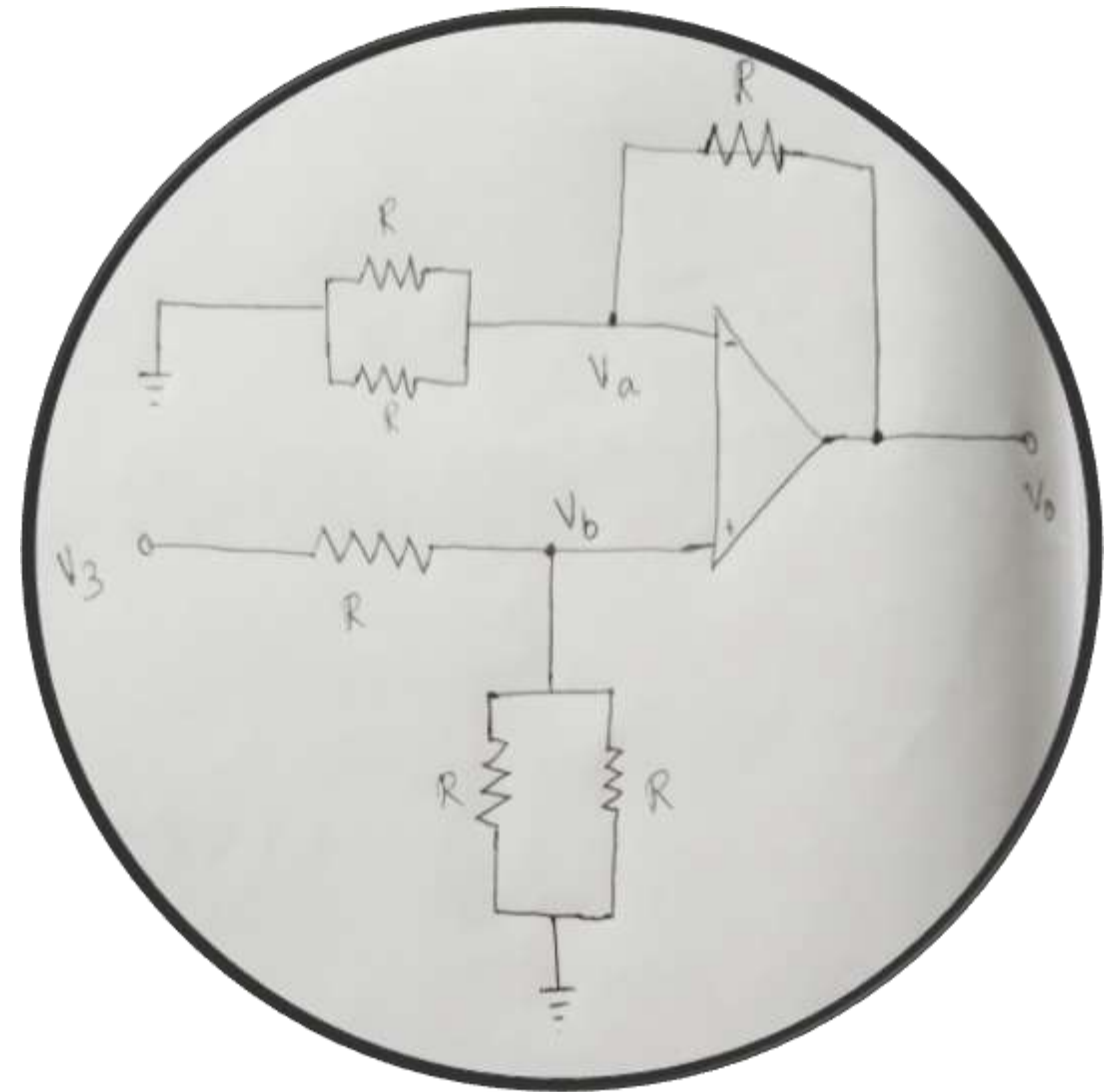
Applications

Adder and Subtractor Amplifier

- It is possible to perform addition and subtraction simultaneously with a single op-amp using the circuit

- The output voltage Vo can be obtained by using superposition theorem

- To find output voltage V01 due to V1 alone , make all other input voltages V2,V3 and V4 =0

Assessment

1. Determine the expression of output voltage for inverting summing amplifier consisting of four internal resistors? (Assume the value of internal resistors to be equal)

a) $V_o = -(R_f/R)\times(V_a + V_b + V_c + V_d)$ b) $V_o = (R_F/R)\times(V_a + V_b + V_c + V_d)$

c) $V_o = (R/R_F)\times(V_a + V_b + V_c + V_d)$ d) None of the mentioned

2. The summing amplifier is an application of:

a) Noninverting op-amp   b) Inverting op-amp

c) Integrator   d) Differentiator

THANK YOU