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Integrator

OBJECTIVE:

- To understand the working principle of Op-amp Integrator.

EQUIPMENTS:

- Oscilloscope.
- Function generator.
- DC power supply (Positive and negative).
- Digital Multimeter.
- Breed board
- Connecting wires.
- Op-Amp I.C 741.
- Few Resistors.
- Stop Watch

THEORY DISCUSSION:

An op-amp integrator simulates mathematical integration, which is basically a summing process that determines the total area under the curve of a function. An ideal integrator is shown in figure 1. Notice that the feedback element is a capacitor that forms an RC circuit with the input resistor.

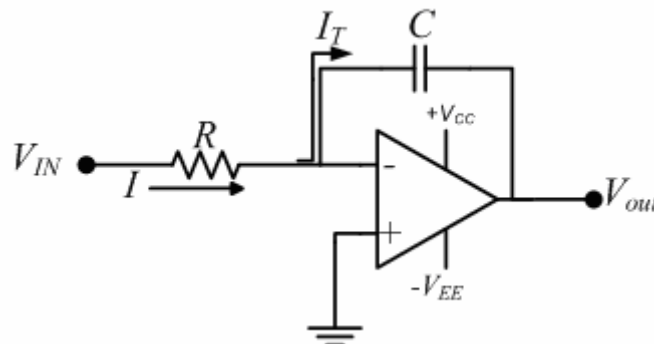


Figure 1

Integration with respect to time can be done by an operational amplifier with –ve input connected to an input by a resistor R and to the amplifier output by a capacitor C. The integration rate is dependent on the time constant RC, which is given by,

$$\frac{\Delta V_c}{\Delta t} = \frac{-I_c}{C} = \frac{-V_{in}}{RC}$$

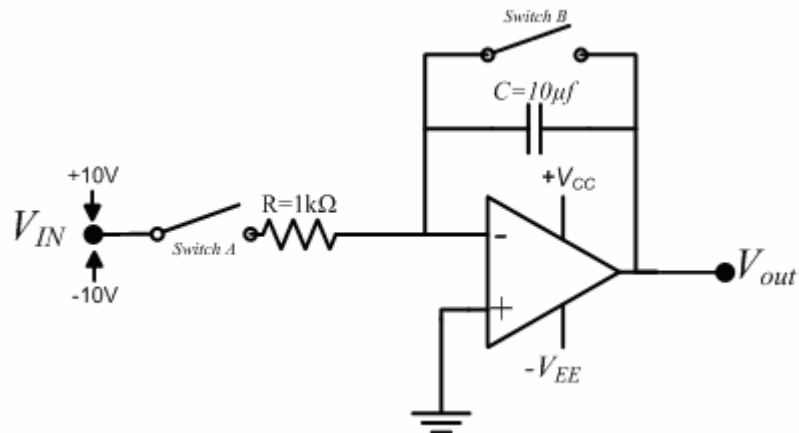


Figure 2

PROCEDURE:

1. Arrange the circuits shown in figure 2.
2. Before powering the circuit, discharge the capacitor by closing the switch B.
3. Now apply the input signal of (\pm) 10V via switch A, for exactly the time shown in the figure 3.
4. Notice that the output stays at a level even after the switch A is OFF.
5. Observe the output and plot it with reference to input.

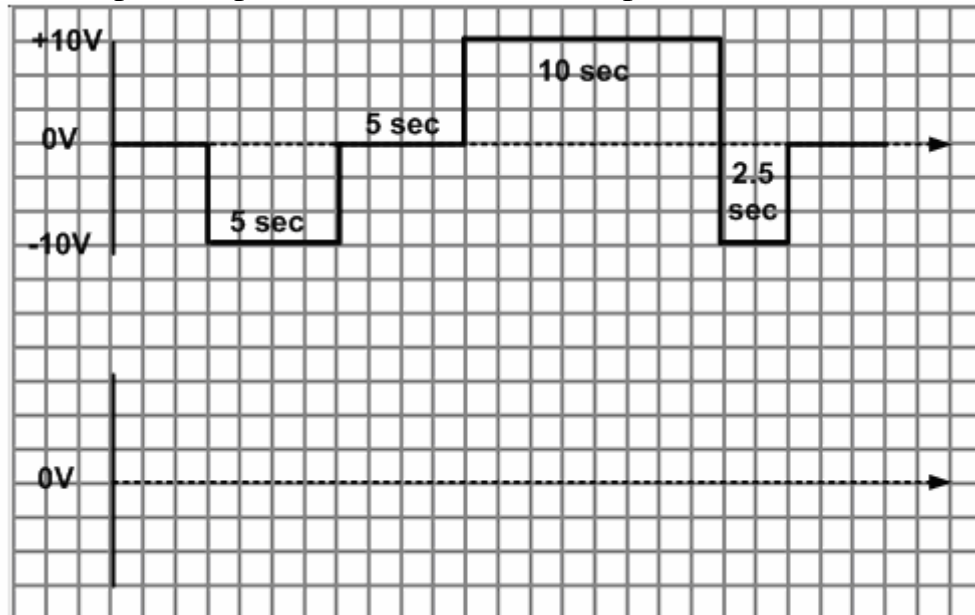


Figure 3

Review Question

Q # 01. Why output voltage does not drop to zero when the input voltage does?

Ans:
