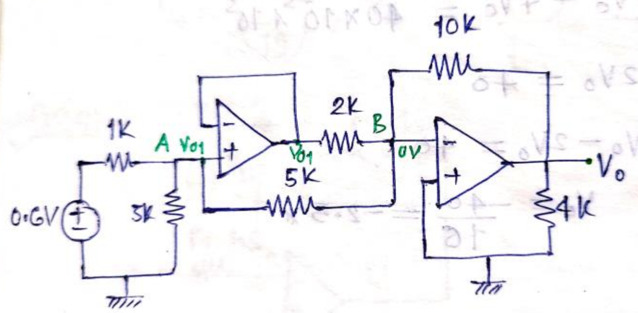
Tutorial-8 Solution

Solution-1:

PROB:-



KCL at node A —

$$\frac{V_{01} - 0.6}{1K} + \frac{V_{01} - 0}{3K} + \frac{V_{01} - 0}{5K} = 0$$

$$15V_{01} + 5V_{01} + 3V_{01} = 0.6 \times 15$$

$$V_{01} = \frac{9}{23} V$$

KCL at node B —

$$\frac{0 - V_{01}}{2K} + \frac{0 - V_0}{10K} + \frac{0 - V_{01}}{5K} = 0$$

$$-5V_{01} + (-V_0) + (-2V_{01}) = 0$$

$$-5 \times \frac{9}{23} - V_0 - 2\left(\frac{9}{23}\right) = 0$$

$$V_0 = -\frac{7 \times 9}{23} = \frac{-63}{23} V$$

Quiz-5

Solution-2:

6.3 CASCADED STAGES

Although the op amp is an extremely versatile device, there are numerous applications in which a single op amp will not suffice. In such instances, it is often possible to meet application requirements by cascading several individual op amps together in the same circuit. An example of this is shown in Fig. 6.15, which consists of the summing amplifier circuit of Fig. 6.9 with only two input sources, and the output fed into a simple inverting amplifier. The result is a two-stage op amp circuit.

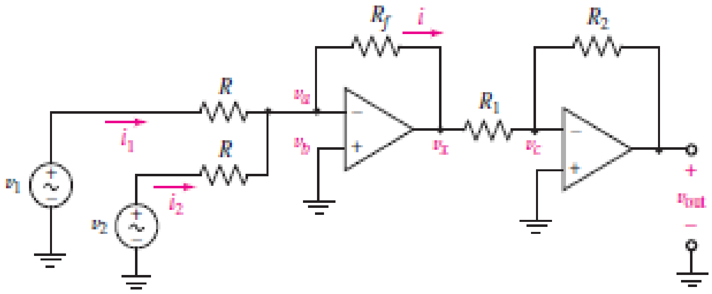


FIGURE 6.15 A two-stage op amp circuit consisting of a summing amplifier cascaded with an inverting amplifier circuit.

We have already analyzed each of these op amp circuits separately. Based on our previous experience, if the two op amp circuits were disconnected, we would expect

$$v_x = -\frac{R_f}{R}(v_1 + v_2) \qquad [7]$$

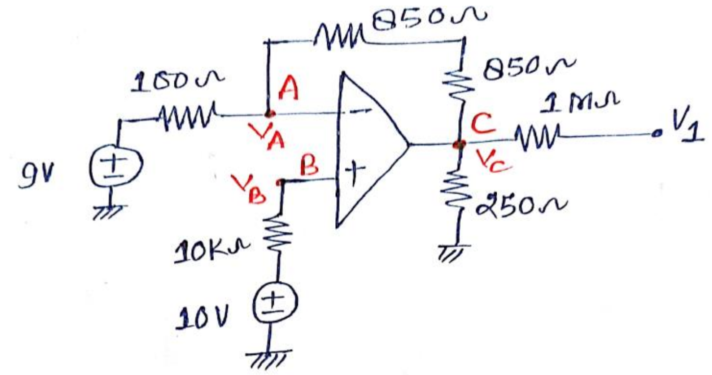
and

$$v_{out} = -\frac{R_2}{R_1}v_x \qquad [8]$$

In fact, since the two circuits are connected at a single point and the voltage v_x is not influenced by the connection, we can combine Eqs. [7] and [8] to obtain

$$v_{out} = \frac{R_2}{R_1}\frac{R_f}{R}(v_1 + v_2) \qquad [9]$$

Solution-3:



$V_A = V_B = 10$ volt (Virtual Short) —— ①

Apply KCL at node-A, we get —

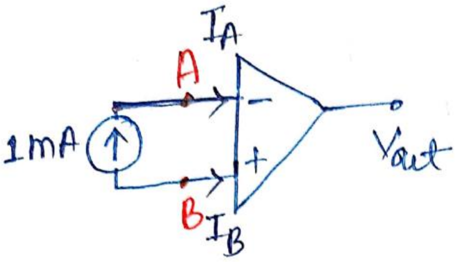
$$\frac{V_A - 9}{100} + \frac{V_A - V_C}{1700} = 0 \quad \text{—— ②}$$

$V_C = V_1$ (No current across 1 MΩ resistance)

③

By using ①, ② & ③, we can get V_1

Solution-4:



For ideal op-amp –

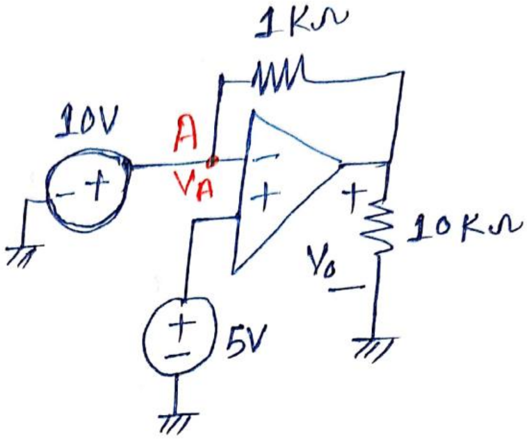
R_{in} (Input impedance) $= \infty$

Hence $I_A = I_B = 0\ A$

According to question –

$I_A = 1\ mA$
$I_B = -1mA$ } Ideal Current Source

Hence violating.



For ideal op amp –

using concept of Virtual Short, $V_A = 5V$

According to question –

$V_A = 10\ V$

Hence violating.