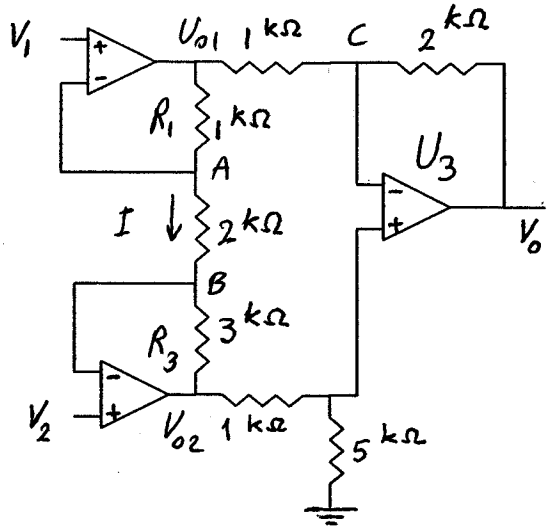
(ECE3455,Q3) In the given circuit, if V_1 =0.45 [V] and V_2=0.35 [V] find V_o .



solution :

The Current I Can be Calculated based on the fact that the voltage of Point A is V_1 and B is V_2

$$I = \frac{V_1 - V_2}{2K} = \frac{0.45 - 0.35}{2} = 0.05\,[mA]$$

$$V_{o1} = V_A + V_{R_1} = 0.45 + I * R_1 = 0.45 + 1K0.05 = 0.5^{V}$$

$$V_{o2} = V_B - 0.05 \times 3 = 0.35 - 0.05 \times 3 = 0.2$$

The non-inverting input voltage of U_3 is

$$V_+ = V_{o2} \times \frac{5}{5+1} = 0.2 \times \frac{5}{1+5} = \frac{1}{6}\,[V]$$

$$V_- = V_+ = \frac{1}{6}$$

Writing KCL at Point C

$$\frac{V_{o1} - V_c}{1} = \frac{V_c - V_o}{2} \qquad \frac{0.5 - 1/6}{1} = \frac{1/6 - V_o}{2}$$

$$\boxed{V_o = -0.5[V]}$$