Assignment no~1

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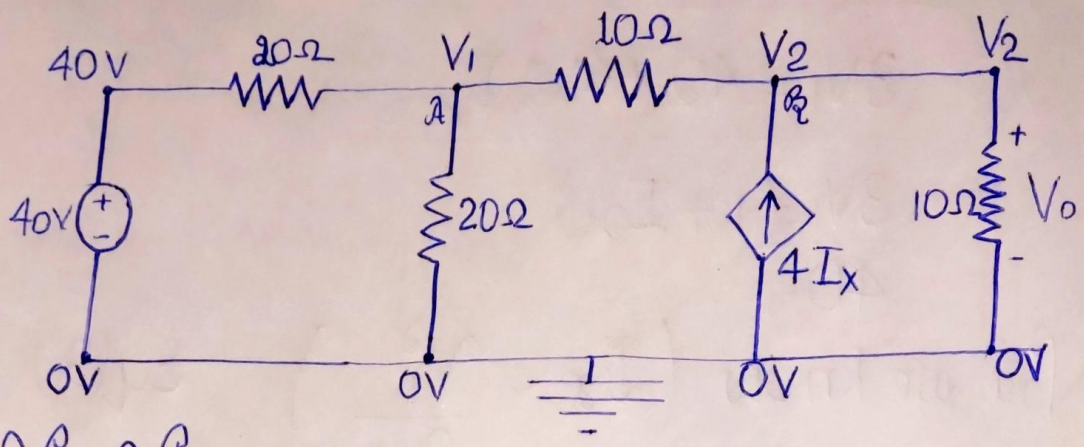
2K20/B17/33
ECE

1.)



Here, $V_2 = V_o$

Applying KCL at node 'A'

$$\frac{V_1 - 40}{20} + \frac{V_1}{20} + \frac{V_1 - V_2}{10} = 0$$

$$\frac{V_1 - 40 + V_1 + 2V_1 - 2V_2}{20} = 0$$

$$4V_1 - 2V_2 - 40 = 0$$

$$2V_1 - V_2 = 20 \quad \text{— Eq(1)}$$

Applying KCL at node 'B'

$$\frac{V_2}{10} + \frac{V_2 - V_1}{10} - 4I_x = 0$$

$$2V_2 - V_1 = 40\,I_x \quad \text{— Eq(2)}$$

$2\times(2V_1 - V_2 = 20)$ Eq(1) $\times 2$

$2V_2 - V_1 = 40I_x$ Eq(2)

$3V_1 = 40 + 40I_x$

$\frac{3V_1}{40} = (1 + I_x)$

Now we know $\left(I_x = \frac{V_1}{20}\right)$ — Eq(3)

$\frac{3V_1}{40} = \left(1 + \frac{V_1}{20}\right)$

$\frac{3V_1}{40_2} = \left(\frac{20 + V_1}{20}\right)$

$\frac{V_1}{2} = 20V$

$V_1 = 40V$ → Eq(4)

$I_x = \left(\frac{V_1}{20}\right) = \left(\frac{40}{20}\right) = 2A$

Putting Value of I_x and V_1 in Eq(2)

$2V_2 - 40 = 80$

$2V_2 = 120V$

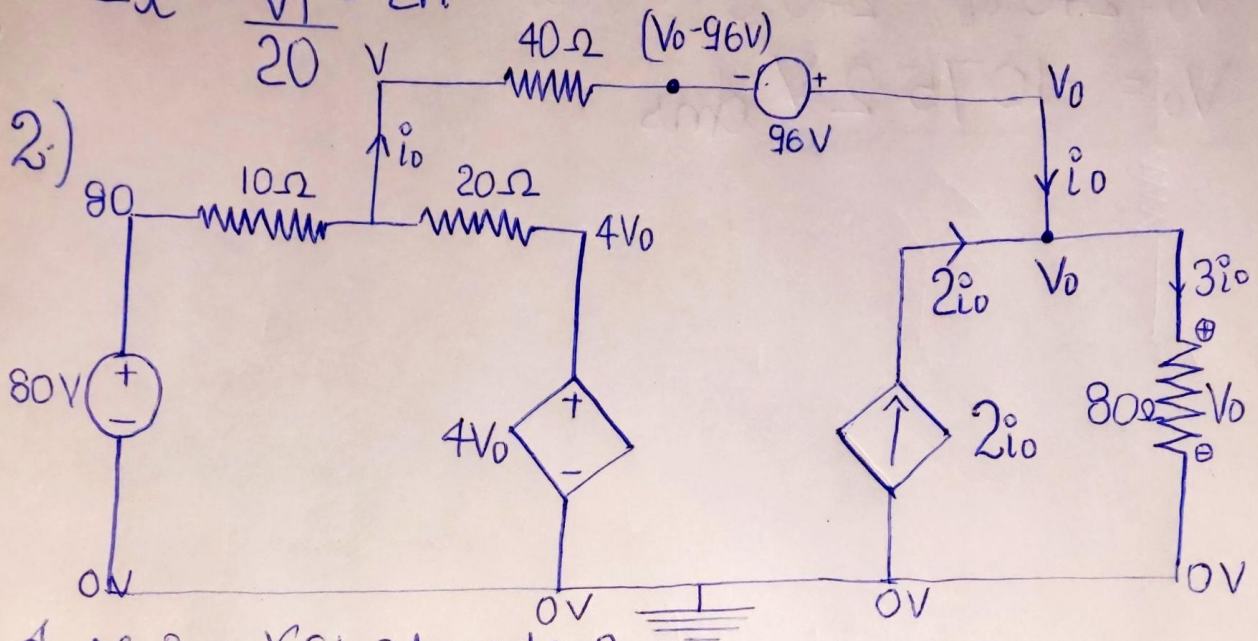
$V_2 = 60V$

$V_o = 60V$

$V_1 = 40V$

$I_x = \frac{V_1}{20} = 2A$

2.)



Applying KCL at node A

$$\frac{V_1 - 80}{10} + \frac{V - 4V_o}{20} + \frac{V-(V_o-96)}{40} = 0$$

$$4V - 320 + 2V - 8V_o + V - V_o + 96 = 0$$

$$7V - 9V_o = 224 \quad -①$$

Also, $V_o = +(3i_o)(80) = 240\, i_o$

$$i_o = \left(\frac{V-(V_o-96)}{40}\right)$$

$\Rightarrow V + 96 = 40\, i_o + V_o = 280\, i_o$ —③

Puts (2) & (3) in (1)

$$7(280\, i_o - 96) - 9(240\, i_o) = 224$$

$-200i_o = 896$

$i_o = -4.48\,A$ Ans

$V_o = 240 i_o = 240(-4.48)$

$V_o = -1075.2\,V$ Ans