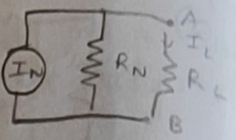
3.10.24

NORTON'S THEOREM :

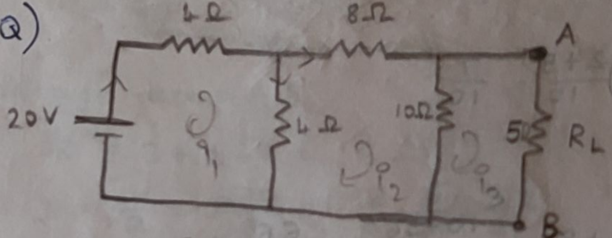


Steps :

1) Remove load resistance and short circuit terminals A and B. $I_L = I_N\left(\frac{R_N}{R_N+R_L}\right)$
2) Find Norton current flowing through A and B
3) Remove the short circuited A and B and replace all the power sources with their internal resistance.
4) Find Norton resistance (R_N).
5) Draw the Norton equivalence resistance and find the current flowing through the load resistance. using ;

$$\boxed{I_L = I_N\left(\frac{R_N}{R_N+R_L}\right)}$$

Q)



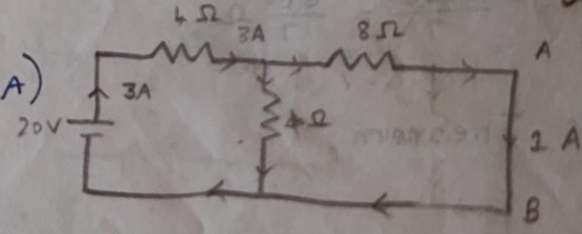
(1/4)

$\frac{1}{R} = \frac{1}{8} + \frac{1}{4} = \frac{4+8}{32} = \frac{12}{32}$

$R = \frac{32}{12} = \frac{16}{6} = \frac{8}{3}\ \Omega$

$R = \frac{8}{3} + 4 = \frac{8+12}{3} = \frac{20}{3}\ \Omega$

A)



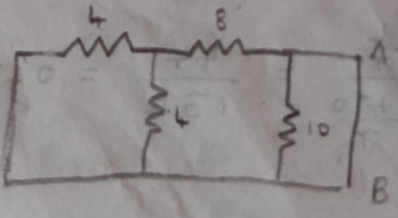
$I = \frac{V}{R} = \frac{20}{\frac{20}{3}} = 3\text{ A}$

$I_N = 3 \times \frac{4}{12}$

$\boxed{I_N = 1\text{ A}}$

~~$\frac{1}{R} = \frac{1}{8} + 8 = \frac{1+64}{8} = \frac{65}{8}$~~ ~~$R = 0.12$~~

~~$I = \frac{V}{R} = \frac{20}{0.12} =$~~



$\frac{1}{R} = \frac{1}{4} + \frac{1}{4} = \frac{4+4}{16} = \frac{8}{16} = \frac{1}{2}$

$R = 2 + 8 = 10$

$\frac{1}{R} = \frac{1}{10} + \frac{1}{10} = \frac{20}{100}$

$$\boxed{R_N = \frac{10}{2}}$$

$\therefore\ I_L = I_N\left(\frac{R_N}{R_N+R_L}\right) = 1\left(\frac{\frac{10}{2}}{\frac{10}{2}+5}\right) = \frac{\frac{10}{2}}{\frac{20}{2}} = \frac{10}{20} = 0.5\text{ A}$