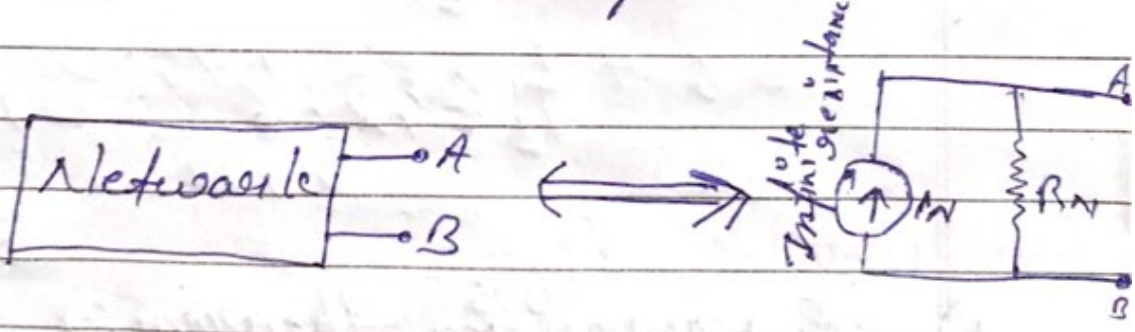
Ans (6)

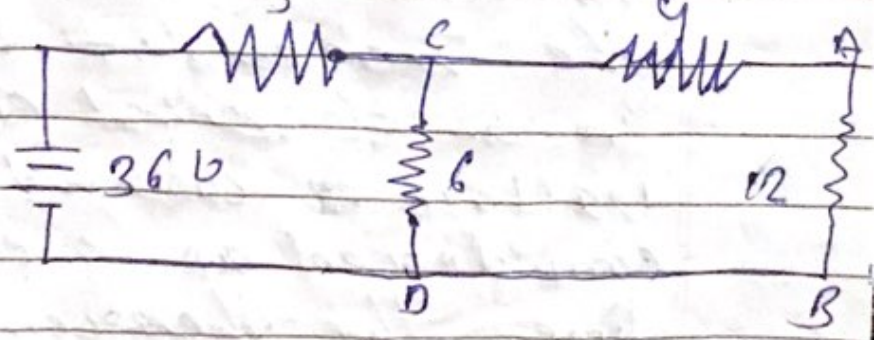
b) Norton's Theorem

This theorem is used where it is easier to simplify a network in terms of current instead of voltages. This theorem reduces a normally complicated network to a simple parallel circuit consisting of

a) an ideal current source I_N of infinite internal resistance
b) a resistance R_N in parallel to it

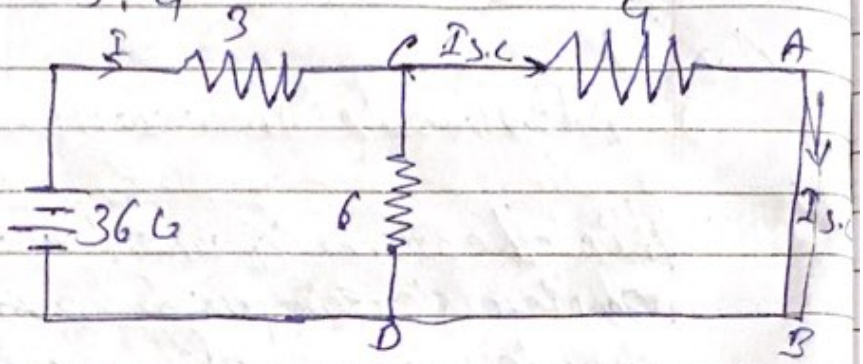


Example. Using Norton theorem find current in Ω 2 3



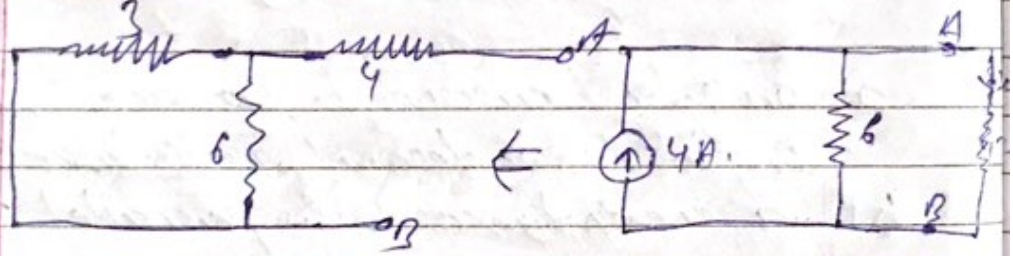
$= 3 + 6 \| 4 = 3 + 2.4 = 5.4\ \Omega$

$I = \frac{36}{5.4} = \frac{20}{3}\ A$



$I_{s.c} = \frac{20}{3} \times \frac{6}{10} = 4A$

$= 4 + 6 \| 3 = 6\ \Omega$



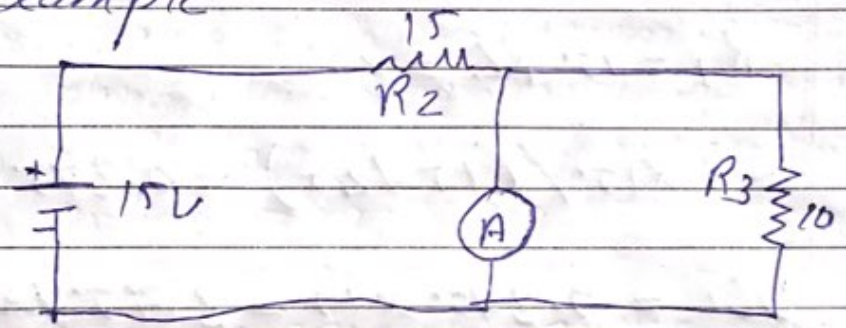
$I_L = 4 \times \frac{6}{6+12} = 1.33\ A$

a) Superposition theorem :-

The superposition theorem is a method for the independent supplies present in an electrical circuit like voltage & current and that is considered as one supply at a time the theorem tells that

In a linear n/w comprising one or more sources, the flow of current through a number of supplies in a circuit in the algebraic calculation of the current when acting the sources like independently.

Example



$V_L = V_S \cdot (R_3 / (R_3 + R_1))$

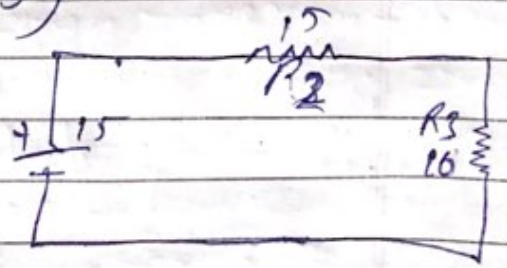
$V_S = 15,\ R_3 = 10 \ \& \ R_2 = 15$

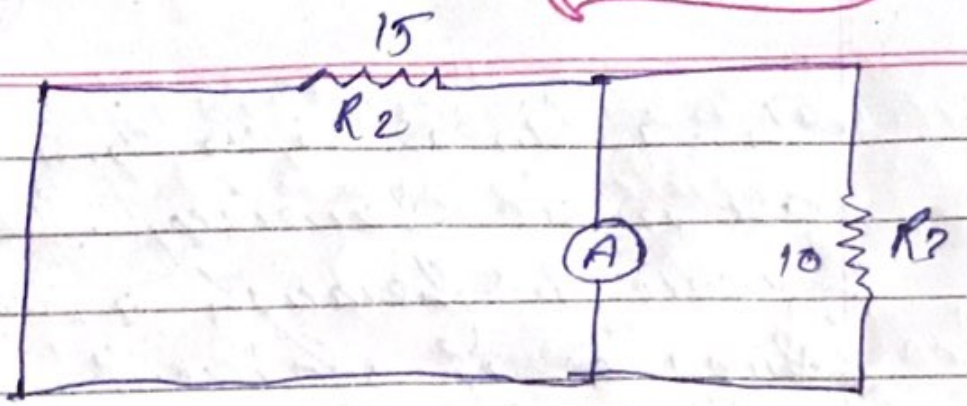
$V_{L_1} = V_S = R_3 / (R_3 + R_2)$

$15\ (10 / (10 + 15))$

$15\ (10/25)$

$= 6$ Volts





$V_{L2} = I \times R$

$IL = I \times R_1 / (R_1 + R_2)$

$R_1 = 15 \quad RL = 25$

$= 1 \times 15 / (15 + 25) = 0.375$ Amps

$VL_2 = 0.375 \times 10 = 3.75$ Volts

$\therefore VL = VL_1 + VL_2$

$= 6 + 3.75 = 9.75$ Volts.