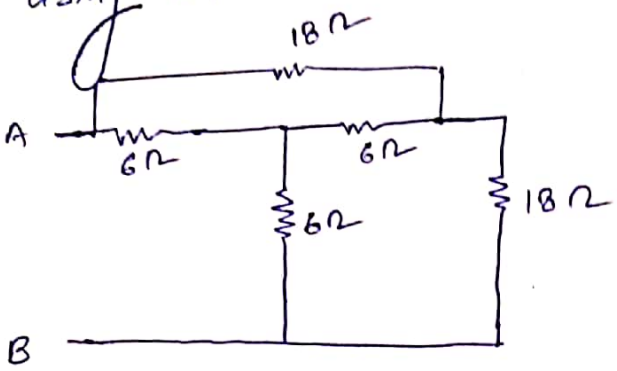
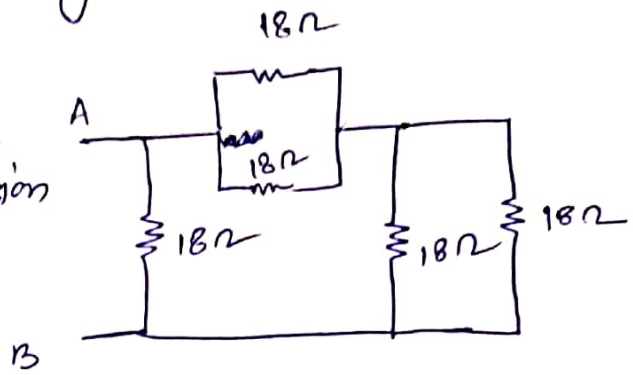
Solution Tutorial-3

Q1 Using star to delta Conversion, we get—



After Conversion ⇒



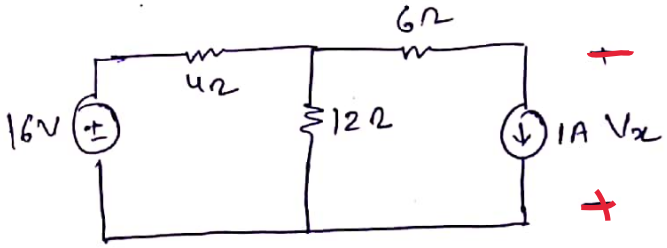
$$R_{AB} = (18 \,||\, 18 + 18 \,||\, 18) \,||\, 18$$

$$= (9 + 9) \,||\, 18$$

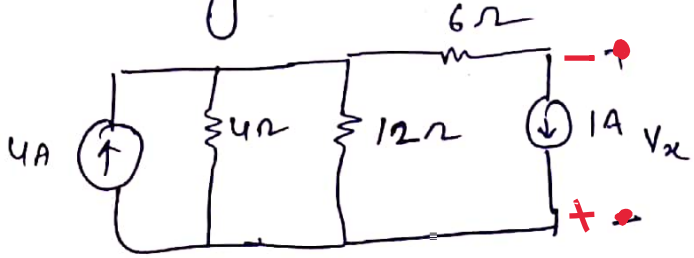
$$= (18) \,||\, 18$$

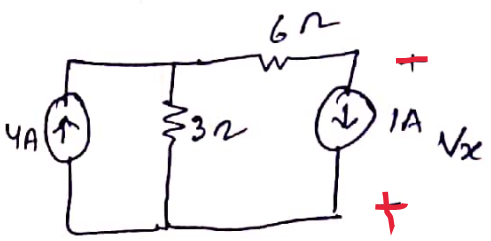
$$= 9$$

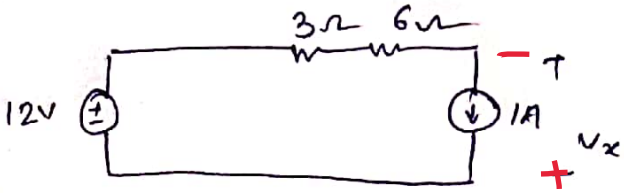
Q2



using Source transformation





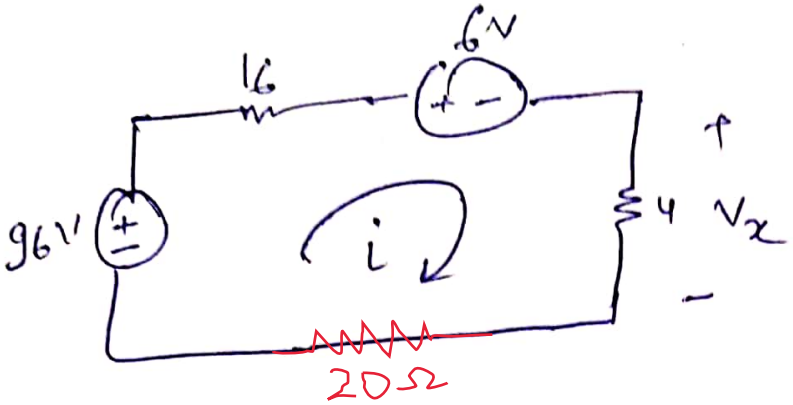


$$-12 + 9 - V_x = 0$$

$$\Rightarrow \cancel{12 = 9 \times 1 + V_x}$$

$$\boxed{V_x = -3V}$$

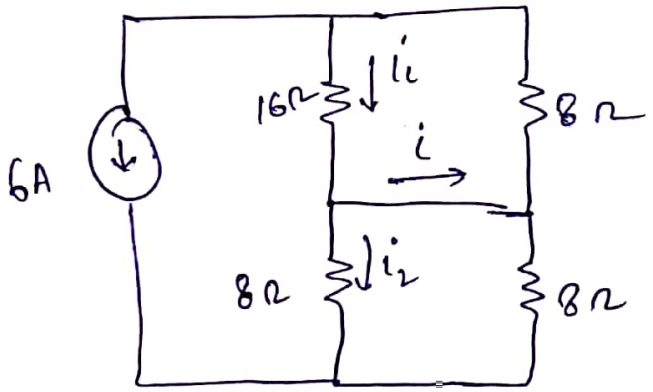
Q3



$96 = 40i + 6$ $\quad i = \frac{90}{40} = 9/4\ A$

So $\boxed{V_x = 4i = 9\ V}$

Q4



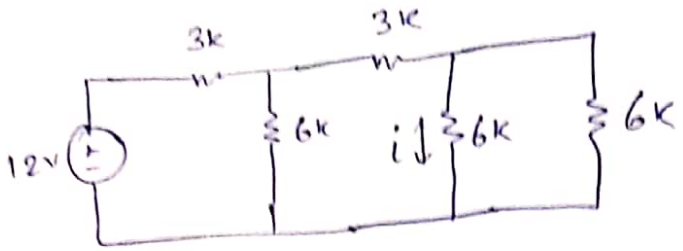
Current division

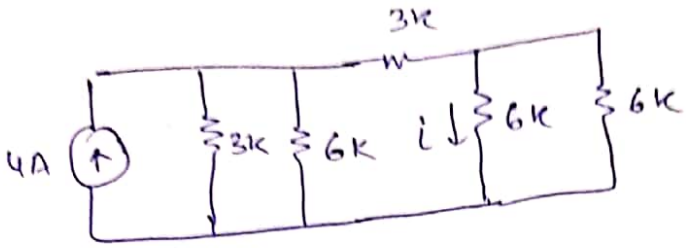
$i_1 = \frac{8}{16+8}(-6) = -2\ A$

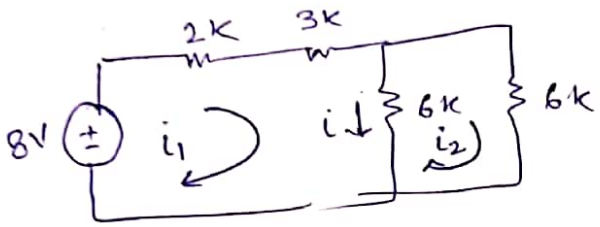
$i_2 = \frac{8}{8+8}(-6) = -3\ A$

$i = i_1 - i_2 = +1\ A$

Q5







$i_1 - i_2 = i$

Loop-1

$8 - 5i_1 - 6(i_1 - i_2) = 0$

$8 = 11i_1 - 6i_2$ — (1)

Loop-2

$-6(i_2 - i_1) - 6i_2 = 0$

$-6i_2 + 6i_1 - 6i_2 = 0$

$i_1 = 2i_2$ — (2)

Put (2) in (1)

$8 = 22i_2 - 6i_2$

$i_2 = \frac{1}{2}\,mA$

$i_1 = 2 \times \frac{1}{2} = 1\,mA$

$i = i_1 - i_2 = 1 - \frac{1}{2} = 0.5\,mA$