Mopon, Renalyn D.
IE-3201

Quiz no. 1

1. $I_x = \frac{5V}{2\Omega} = -2.5A$

$3\Omega = 0$

KVL:

$-(-5V) + V_{3\Omega} - V_{x_1} = 0 \rightarrow V_{x_1}$

$V_{x_1} = -(-5V) = 5V$

$2\Omega = 0; I_{x_2} = 0\text{-}A; 3\Omega = 0$

KVL: $-(3V) + V_{2\Omega} + V_{x_2} + V_{3\Omega} = 0 \rightarrow V_{x_2} = 3V$

$2\Omega = 0$

$I_3 = 1A$

KVL $= V_{x_3} + V_{3\Omega} = 0 \rightarrow V_3 + (-1A)(3\Omega) = 0$

$V_{x_3} = 3V$

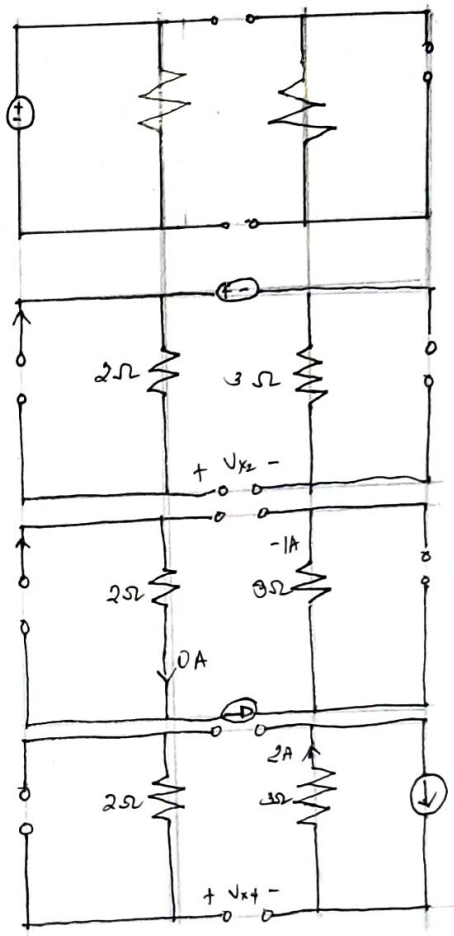
$2\Omega = 0$

$I_{x_4} = 0A$

$3\Omega = 2A$

KVL: $V_{x_4} + V_{3\Omega} = 0 \rightarrow 0 \rightarrow V_{x_4} + 2(A)(3\Omega)$

$0 \rightarrow V_{x_4} = -6V$



$V_x = V_{x_1} + V_{x_2} + V_{x_3} + V_{x_4}$

$= 5V + 3V - 6V$

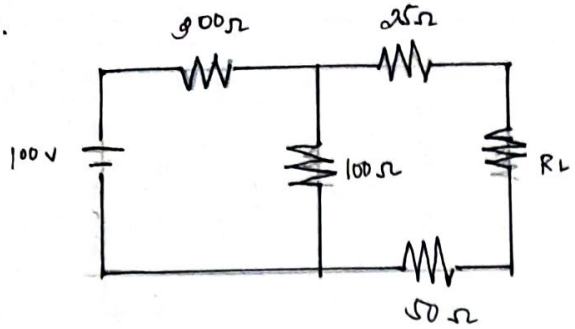
$\boxed{V_x = 5V}$

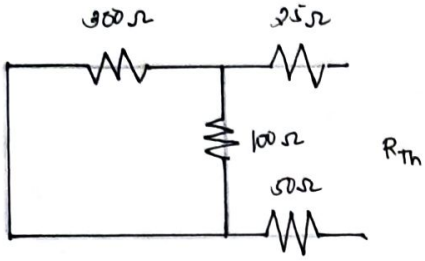
$I_x = I_{x_1} + I_{x_2} + I_3 + I_{x_4}$

$= -2.5A + 1A + 0A$

$\boxed{I_x = -1.5A}$

2.



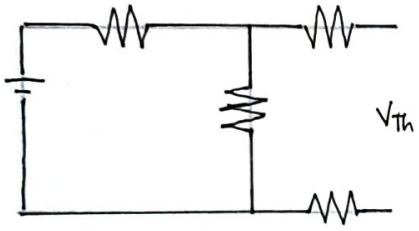


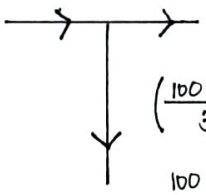
R_{Th}

$R_{Th} = (100 \| 300) + 25 + 50$

$= (1/100 + 1/300)^{-1} + 25 + 50$

$\boxed{R_{Th} = 150\ \Omega}$



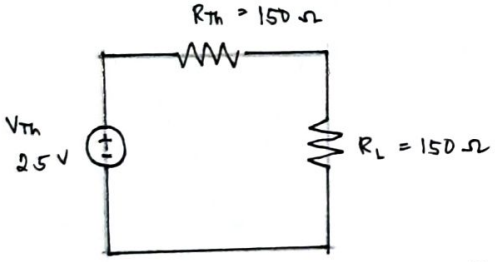


$\left(\frac{100 - V_{Th}}{300} - \frac{V_{Th}}{100} = 0\right) 300$

$100 - V_{Th} - 3V_{Th} = 0$

$-4V_{Th} = -100$

$\boxed{V_{Th} = 25\ V}$



$R_{Th} = R_L$

$\boxed{R_L = 150\ \Omega}$

$P_{max} = \frac{V_{Th}^2}{4R_{Th}}$

$= \frac{(25)^2}{4(150)}$

$= 25/24$

$\boxed{P_{max} = 1.04\ W}$

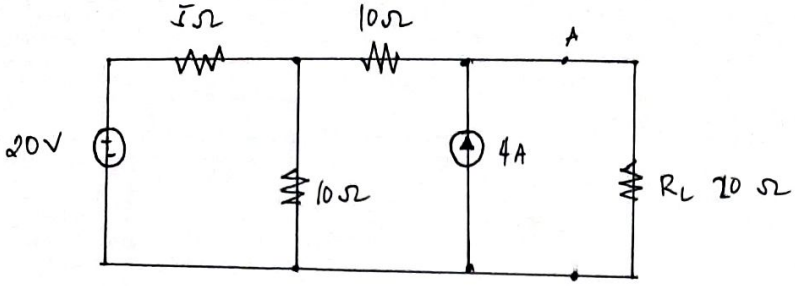
$R_{Th} = 150\ \Omega$

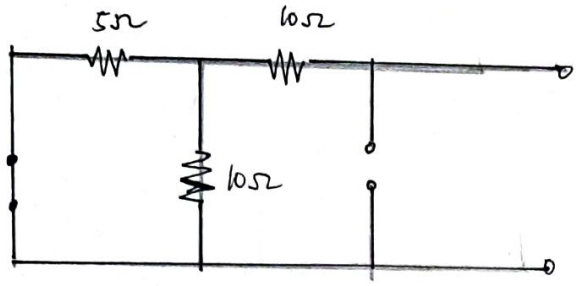
$R_L = 150\ \Omega$

$V_{Th} = 25\ \Omega$

$P_{max} = 1.04\ W$

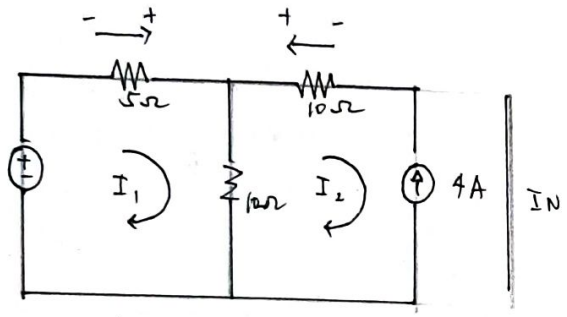
3.





$$R_N = (5 \| 10) + 10$$
$$= \left(\frac{1}{5} + \frac{1}{10}\right)^{-1} + 10$$
$$R_N = \frac{40}{3}$$

$$\boxed{R_N = 13.33\ \Omega}$$



$I_2 = 4A$

$20 + 5I_1 + 10(I_1 - I_2) = 0$

$20 + 15I_1 - 10I_2 = 0$

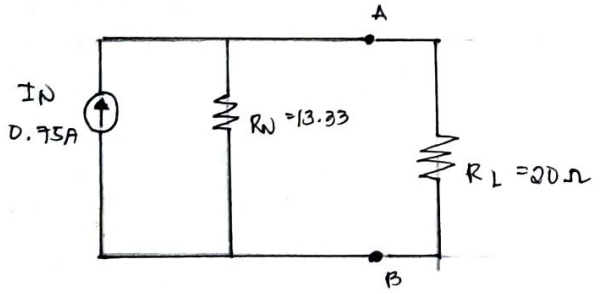
$20 + 15I_1 - 10(4) = 0$

$20 + (40) = 15I_1$

$-20 = 15I_1$

$I_1 = -1.33\ A$

$$\boxed{I_N = 1.33}$$



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

$$= \frac{40/3}{40/3 + 20}(1.33)$$

$I_L = 133/250 \simeq 0.532$

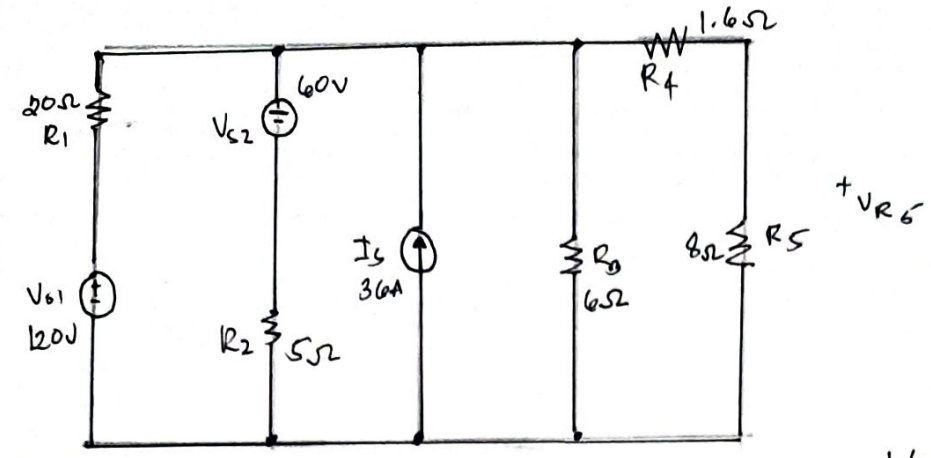
$$\boxed{I_L = 0.532\ A}$$

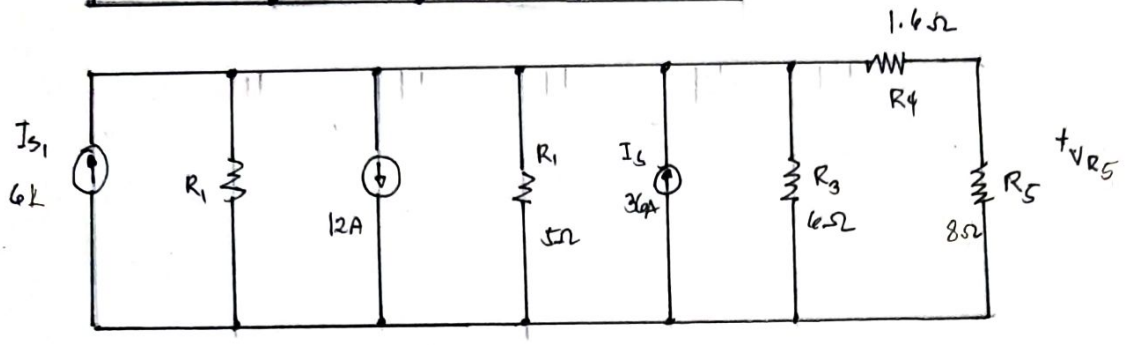
$V_L = I_L R_L$

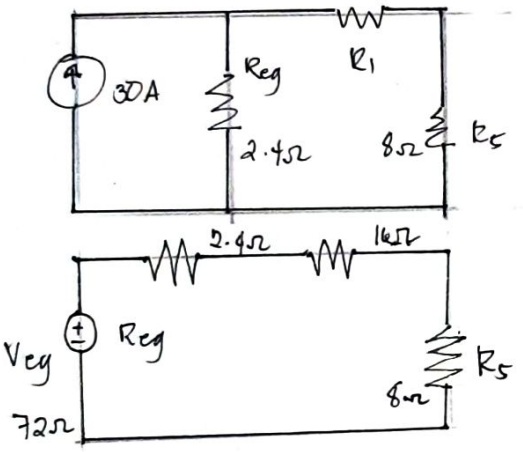
$V_L = 0.532(20)$

$$\boxed{V_L = 10.64 V}$$

4.







$I_{eq} = 6A - 12A + 36A = 30A$

$R_{eq} = 20\Omega \,||\, 5\Omega \,||\, 6\Omega = 2.4\Omega$

$$V_{R5} = \frac{R_5}{R_{eq} + R_4 + R_5} V_{eq} +$$

$$= \frac{8\Omega}{2.4\Omega + 1.6\Omega + 8\Omega} (72V)$$

$$\boxed{V_{R5} = 48V}$$