NUST School of Electrical Engineering and Computer Science
(Department of Electrical Engineering)
EE 111 Linear Circuit Analysis

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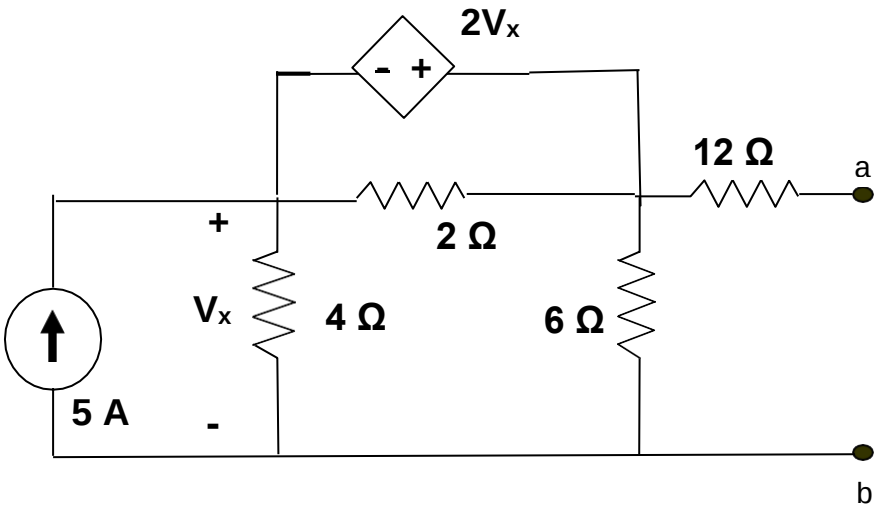
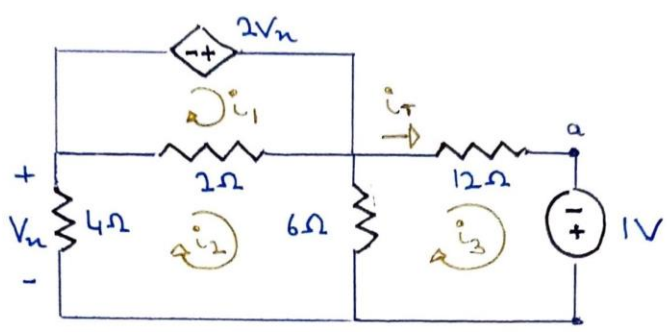
Registration No. and Sections: 345834 BEE12C

Home Assignment No 4: Maximum Power Transfer Theorem

What value of load connected to this network shall receive maximum power?
(Note: Please show all steps including any rough work. Use only A4 size white paper. The title of uploaded file must be HA No 4 in pdf.)



Connecting a test source between a and b and eliminating any independent sources.



$V_n = -4i_2$

$R_{TH} = \frac{V_{Test}}{I_T}$

Mesh 1:

$$-2V_n + 2(i_1 - i_2) = 0$$
$$-2(-4i_2) + 2(i_1 - i_2) = 0$$
$$8i_2 + 2i_1 - 2i_2 = 0$$
$$\underline{2i_1 + 6i_2 = 0}$$

Mesh 2:

$$4i_2 + 2(i_2 - i_1) + 6(i_2 - i_3) = 0$$
$$\underline{-2i_1 + 12i_2 - 6i_3 = 0}$$

Mesh 3:

$$12i_3 - 1 + 6(i_3 - i_2) = 0$$
$$\underline{-6i_2 + 18i_3 = 1}$$

$\boxed{i_3 = 0.0625}$ $\therefore i_3 = I_T$

Now, $R_{TH} = \frac{V_T}{I_T}$

$= 1/0.0625$

$\underline{R_{TH} = 16\ \Omega}$

- The power is maximum when $R_L = R_{TH}$. Hence, the value of R_L is;

$\boxed{R_L = 16\ \Omega}$