Elec 275 – Principles of Electrical Engg
Quiz No.6 – Fall 2015

Name: **I.D.No:**

6. In Fig 6,
   (a) Obtain the Thevenin Equivalent of the circuit connected to the load R_L
   (b) Obtain the value of R_L required for maximum power transfer and also find the value of the maximum power transferred, P_{max} (5 marks)

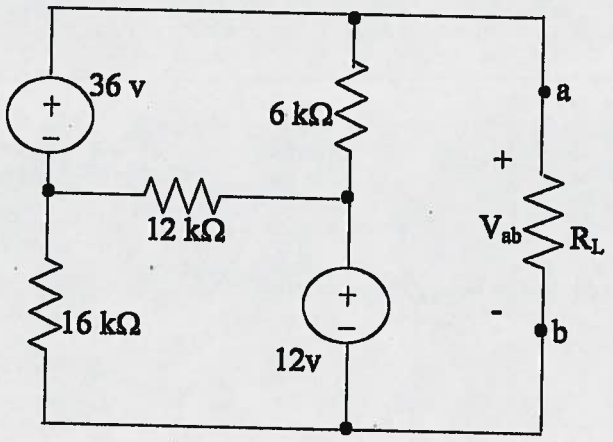
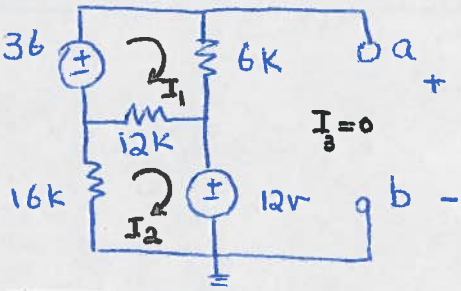


Fig.6.

Solution:

a) $V_{th} = V_{ab} = V_{oc}$ after removing R_L



KVL: $6I_1 + 12(I_1 - I_2) = 36$

$18I_1 - 12I_2 = 36$

KVL: $12(I_2 - I_1) + 16I_2 = -12$

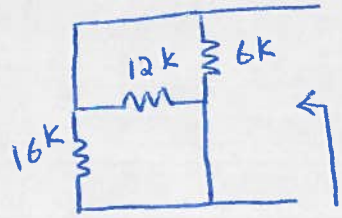
$-12I_1 + 28I_2 = -12$

$I_1 = 2.4$ (mA)

$I_2 = 0.6$ (mA)

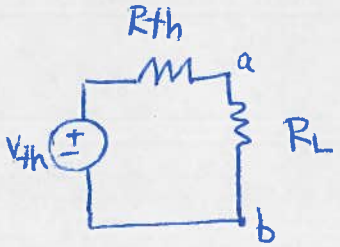
$V_{ab} = 6I_1 + 12 = 6 \times 2.4 + 12 = 26.4$ (V) $= V_{th}$

To calculate R_{th}:



$\frac{1}{R_{th}} = \frac{1}{6} + \frac{1}{12} + \frac{1}{16}$

$R_{th} \Rightarrow (6 \| 12 \| 16) = 3.2\ k\Omega$



b) MPT $\Rightarrow$ $R_L = R_{th} = 3.2 k\Omega$

$P_{Lmax} = \frac{V_{th}^2}{4 R_{th}} = 54.4$ mW