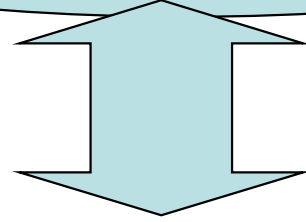


Thevinin's theorem



• نظرية ثفنن

B –Rationale مبررات الوحدة

- It is very important to study Thevinins theorem.
- Also to study how apply the three step to the save theorem .

C – Central الفكرة المركزية Idea

- Definition Thevenin's theorem .
- How we find the current at each resistance in the net work by the above theorem.

D- Aim of lecture

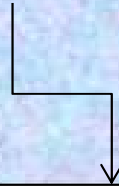
To let the student be able to identify the analyses net work by using Thevinins' theorem.

الأختبار القبلي

Pretest

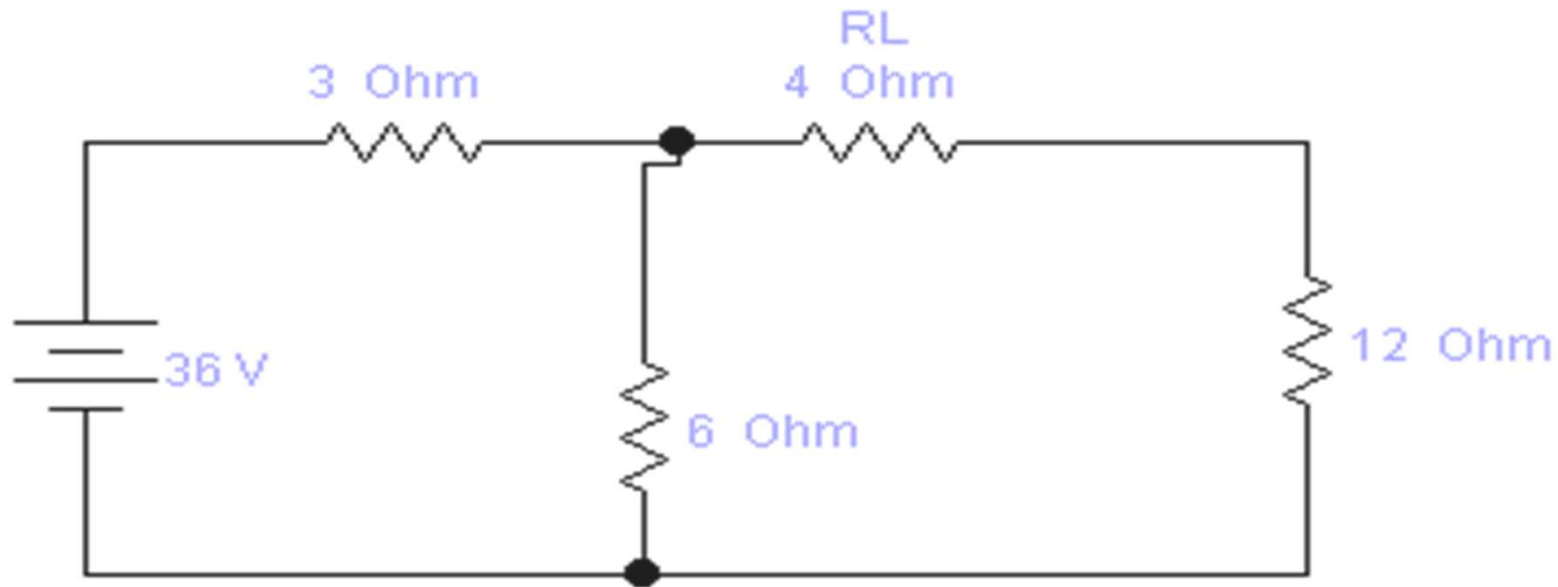
Define : Load resistance, The equivalent circuit
عرف : مقاومة الحمل, الدائرة المكافئة

Solution



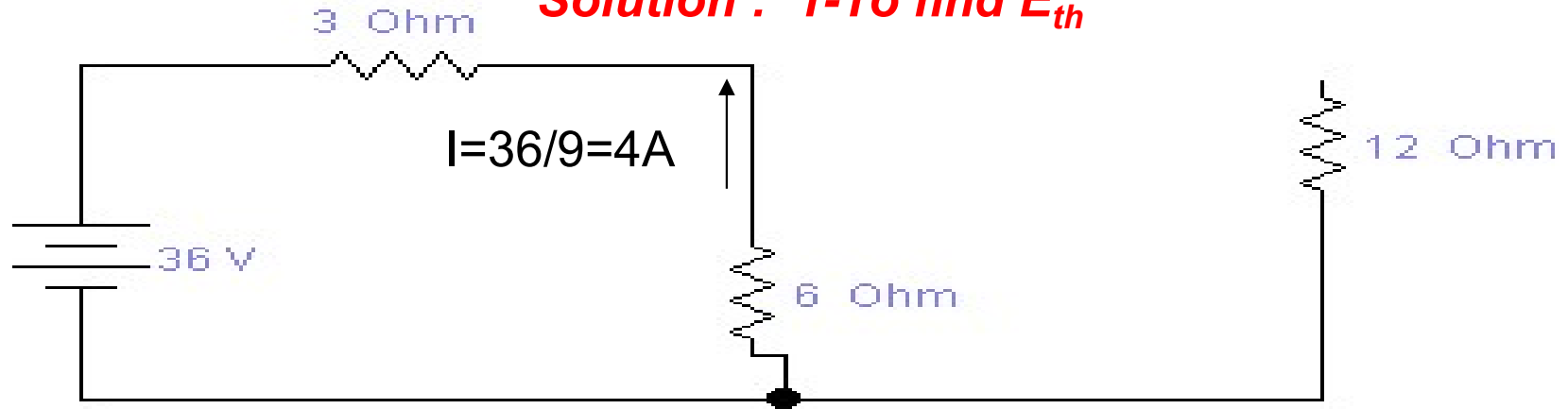
Load resistance هي المقاومة المطلوب ايجاد التيار المار بها من بين باقي مقاومات الدائرة الكهربائية

The equivalent circuit هي الدائر التي يختزل فيها عدد المقاومات الى مقاومتين فقط في الدائرة الكهربائية مهما كان عدد مقاومات الدائرة وتسحب مقاومة الحمل تيارا يكافئ (يساوي) تيار مقاومة الحمل في الدائرة الأصلية



EX. (1): - In the cct. Shown above
Find(I_L) by using Thevinins,
theorem

Solution : 1-To find E_{th}

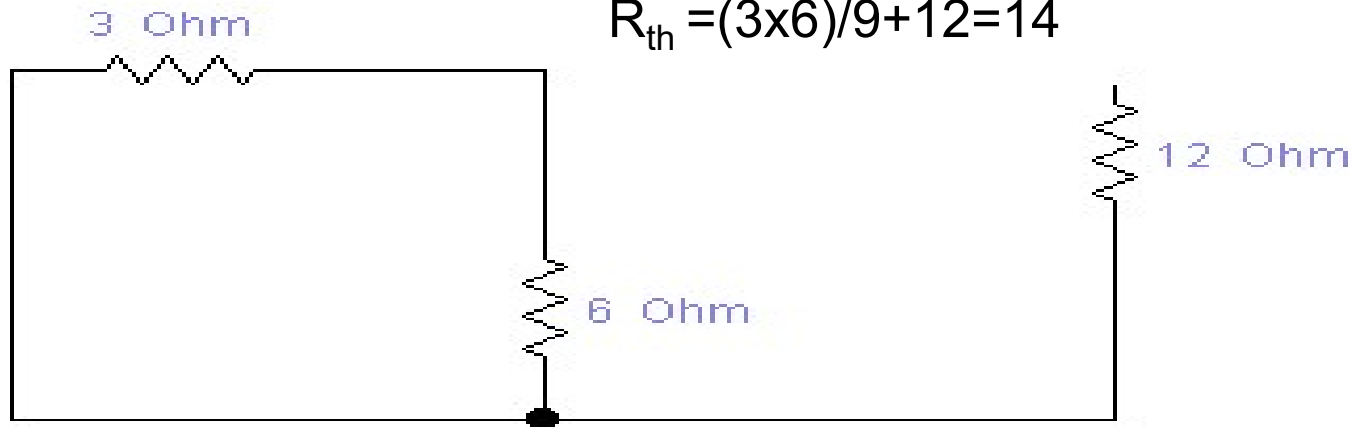


$$E_{th} = 4A \times 6 = 24v$$

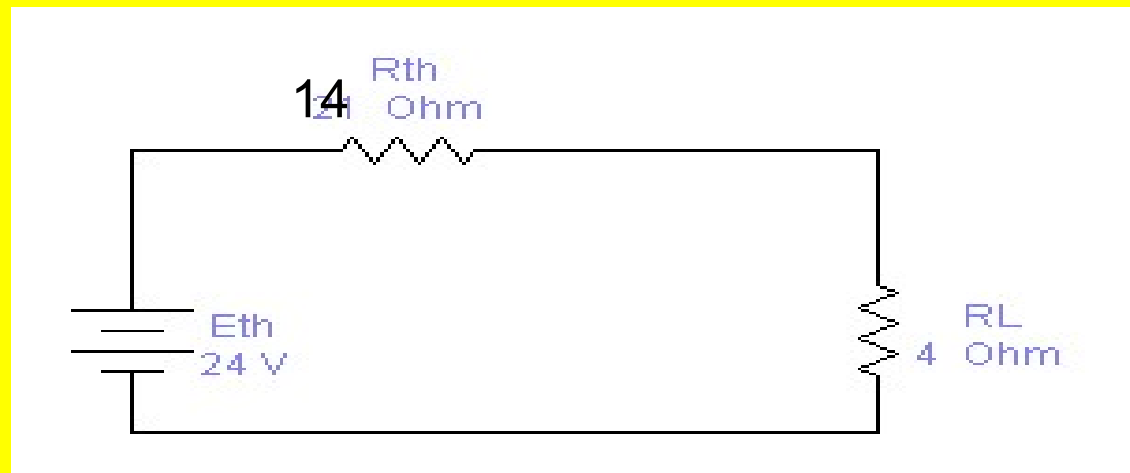
2- To find R_{th}



$$R_{th} = (3 \times 6)/9 + 12 = 14$$

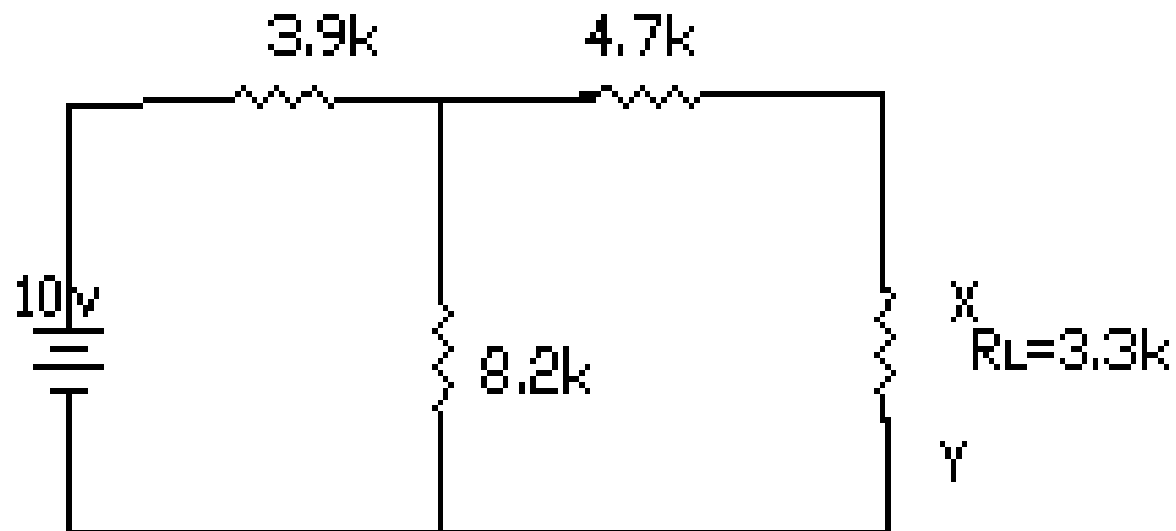


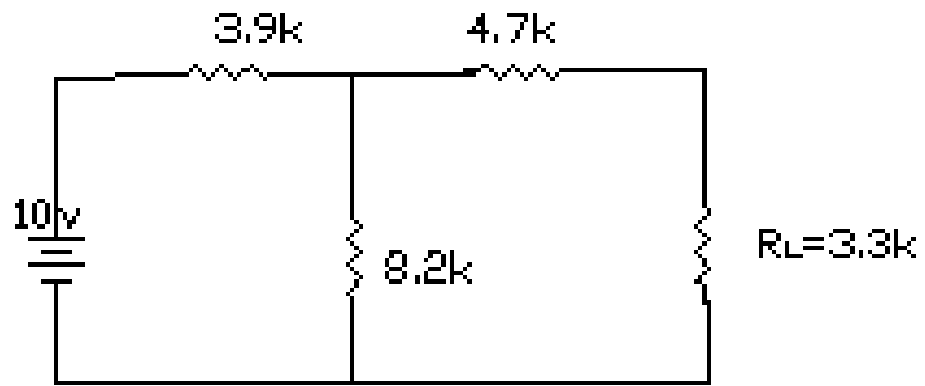
3-Thevenins Equivalent

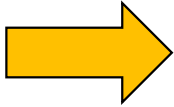


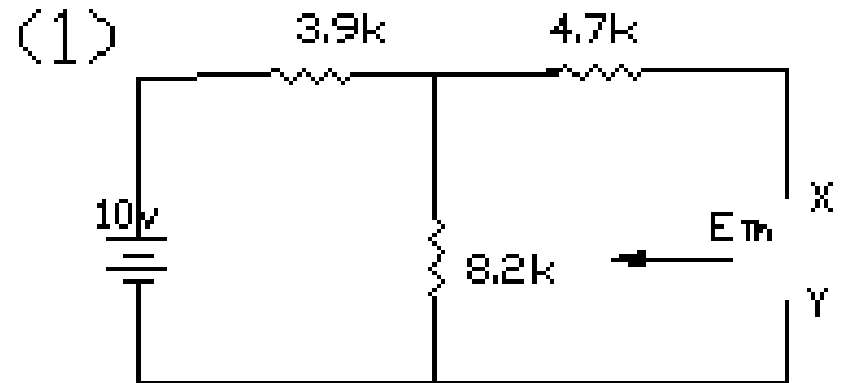
$$I_L = 24 / (14 + 4) = 1.333 \text{ A}$$

Ex.(2) : For the cct shown below find (V_L) by using Thevinins theorem

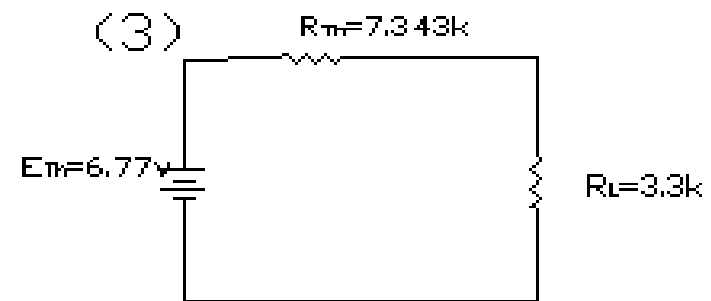
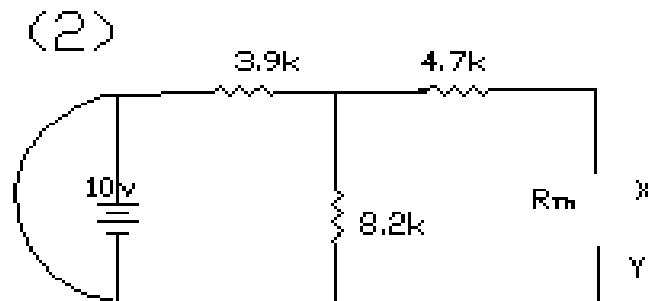




Solution 



$$E_{th} = (10\text{v}) \times (8.2\text{k}\Omega) / (3.9) + (8.2) = 6.77\text{v}$$



$$R_{Th} = (8.2 \times 3.9) / (8.2 + 3.9) + 4.7$$
$$= 7.343 \text{ k}\Omega$$

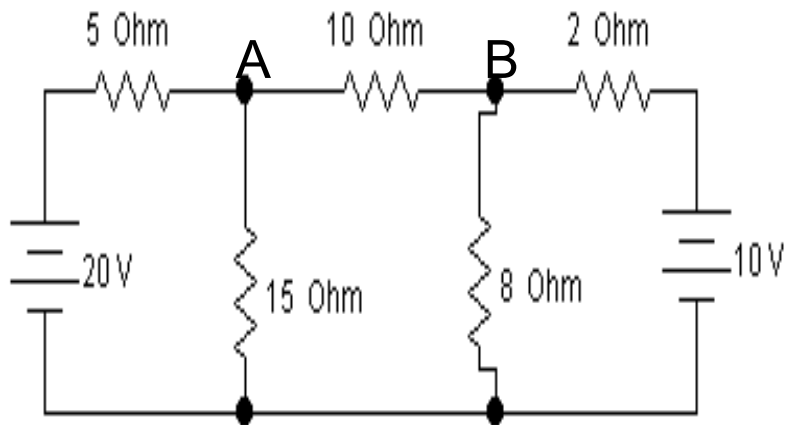
$$I_L = (E_{Th}) / (R_{Th} + R_L) = 6.77 / (7.343 + 3.3)$$
$$= 0.636 \text{ mA}$$

$$\therefore V_L = I_L \times R_L = 0.636 \text{ mA} \times 3.3 \text{ k}\Omega$$
$$= 2.099 \text{ V}$$

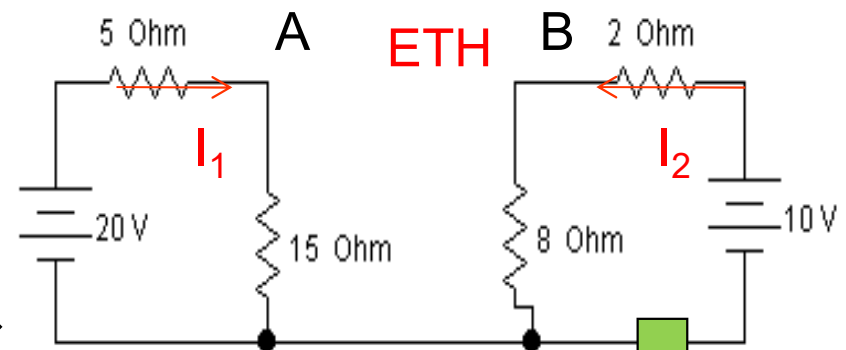
Posttest

الاختبار الـبعدي

Home work : Using Thevenin's theorem To Find (I_L).



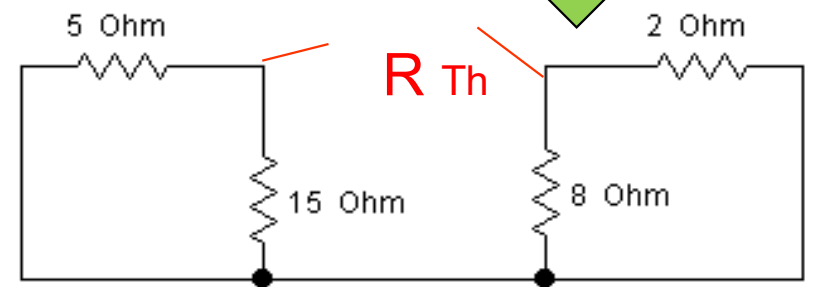
Solution



$$I_1 = 20 / (5 + 15) = 1A \quad , V_{at15\Omega} = 1 \times 15 = 15v$$

$$I_2 = 10 / (2 + 10) = 1A \quad \therefore V_{at8\Omega} = 1 \times 8 = 8v$$

$$\therefore E_{th} = 15 - 8 = 7v$$



$$R_{Th} = (5 \times 15) / (5 + 15) + (8 \times 2) / (8 + 2) = 5.35\Omega$$

$$\therefore I_L = I_T = 7 / (5.35 + 10) = 0.456 A$$

