

**Fall 2018: EE-240 Circuits I**  
**Assignment # 03**  
**Due Date: 1 November 2018, Thursday**

**Please read the following instructions:**

- Submit the assignment on A-4 sheets bound together. Please note that assignments submitted from torn notebook pages will not be accepted.
- You are required to submit the assignment at the start of class on the due date. Late submissions will not be accepted.
- Please ensure that you have clearly written your name and roll numbers on the assignment.
- The assignment is long, so you are advised to start as soon as possible. Please note that no deadline extension requests will be entertained.
- You are aware of the LUMS honor code and therefore, any plagiarism attempts will be directly reported to the **Disciplinary Committee**. If you are facing any difficulties or have questions, ask the course staff (Instructor/TA), they are there to help you.

The total marks for the assignment are **100**.

Q1: Use Gauss elimination to solve the following set of equations:

[10]

$$6i_1 - 8i_2 - 10i_3 + 12i_4 = 8$$

$$2i_1 - 4i_2 + 5i_3 + 6i_4 = 33$$

$$-8i_1 + 20i_2 + 14i_3 - 16i_4 = 10$$

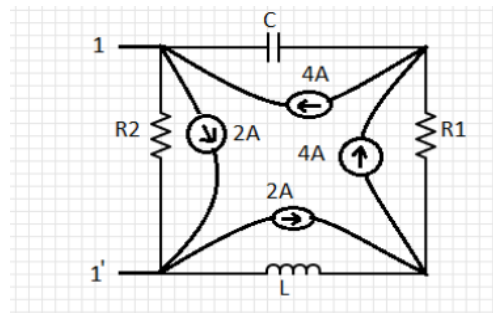
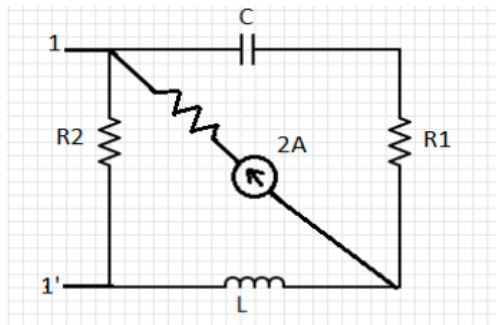
$$5i_1 + 7i_2 + 2i_3 - 10i_4 = -15$$

Q2: Explain the following in detail

a) What are equivalent networks? [3]

b) Are the two networks shown below Equivalent networks (with respect to terminal 1-1')? Justify your response? [5]

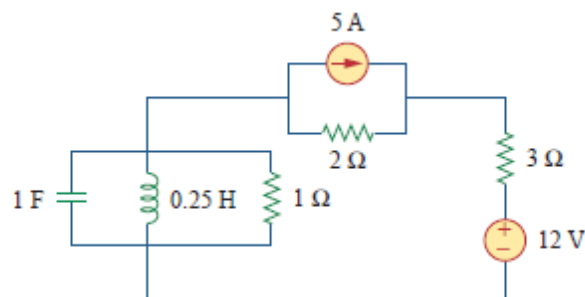
c) Are these also topologically equivalent? Based on the example above can you draw some conclusion about topological equivalence of Equivalent networks [2]



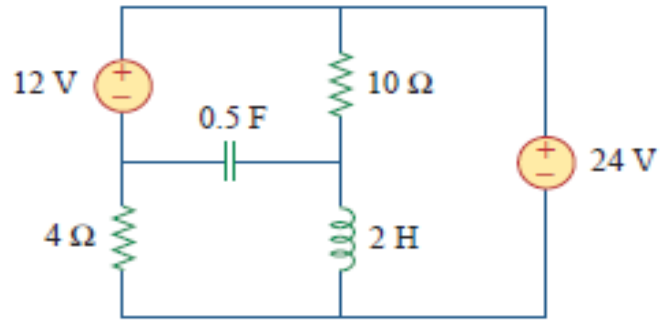
Q3: Draw the dual of the following circuits:

[5+5]

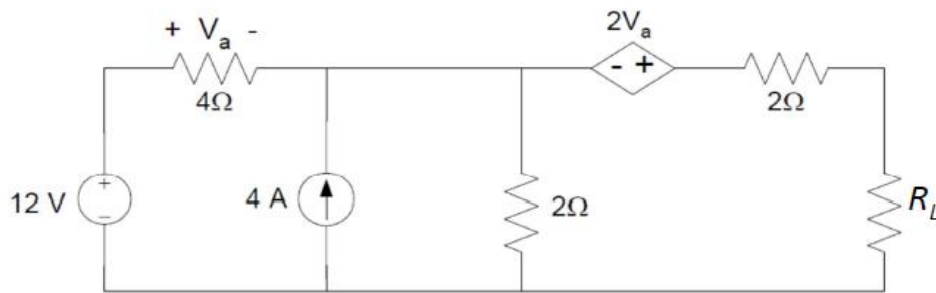
a)



b)

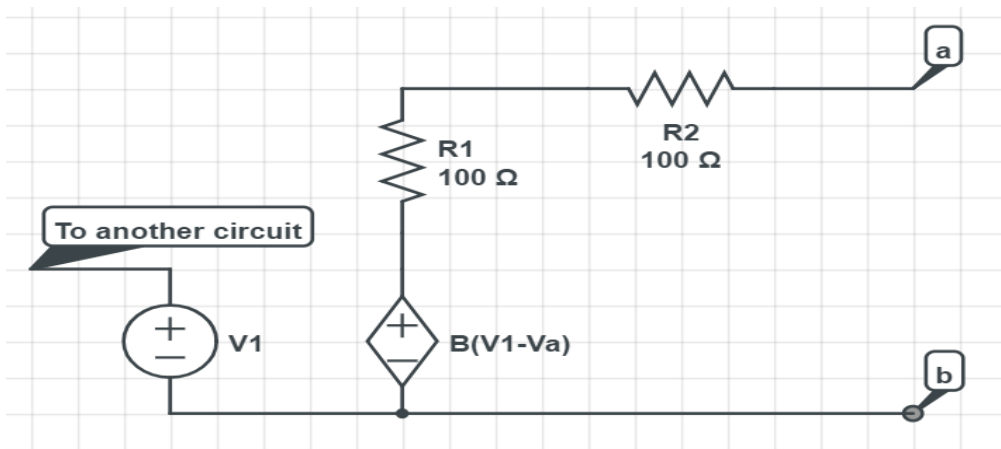


Q4: For the circuit below, use Thevenin's theorem to determine the current flowing through  $R_L$ . Also determine the value of  $R_L$  for which maximum power is transferred to it. [15]



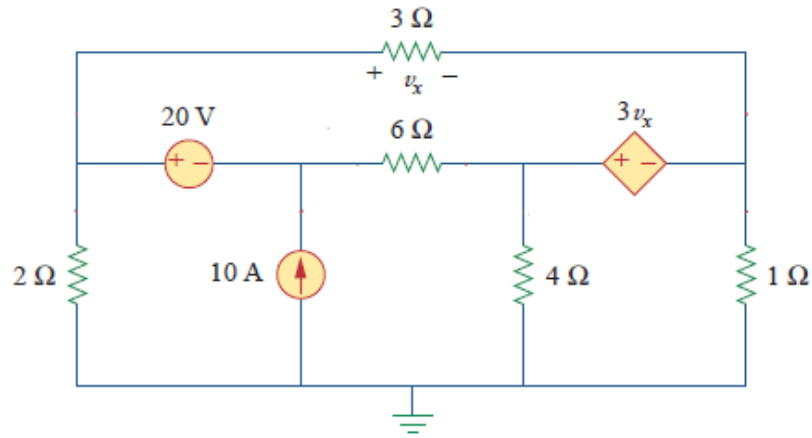
Q5: Find Thevenin equivalent circuit across a-b:

[10]



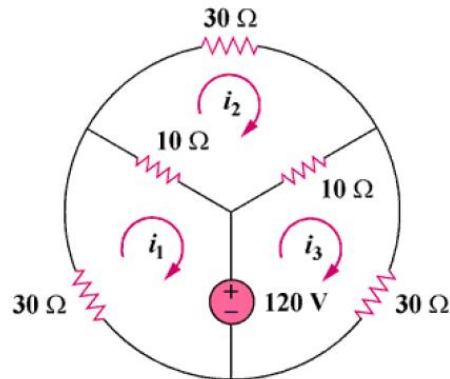
Q6: Label and find the node voltages of the following network.

[20]



Q7: Calculate  $i_1$ ,  $i_2$  and  $i_3$ . Use Gaussian elimination method for the computation of currents.

[10]



Q8: Find  $V_1$  in terms of 't' and calculate the current in each branch in terms of 't'.

[15]

