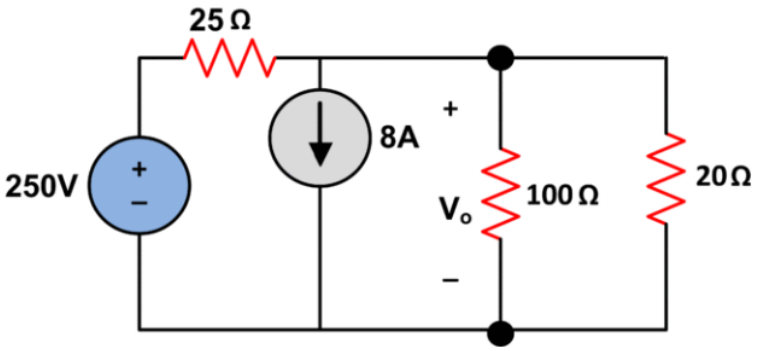
Fall 2018: EE-240 Circuits I
Assignment # 02
Due Date: 16 October 2018, Tuesday

Please read the following instructions:

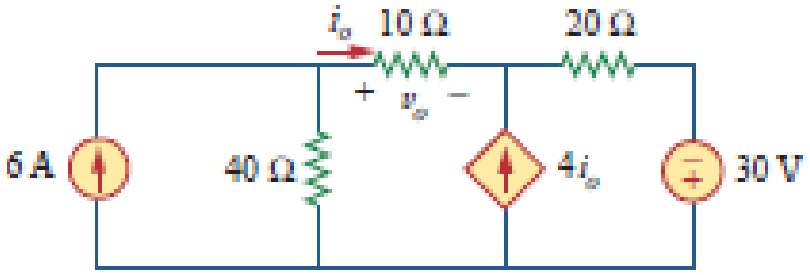
- Submit the assignment on A-4 sheets bound together. Please note that assignments submitted from torn notebook pages will not be accepted.
- You are required to submit the assignment at the start of class on the due date. Late submissions will not be accepted.
- Please ensure that you have clearly written 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: Find V_o indicated in the circuit below using source transformation. [10]



Q2: Use superposition principle to find i_o and v_o in the circuit given below. [10]



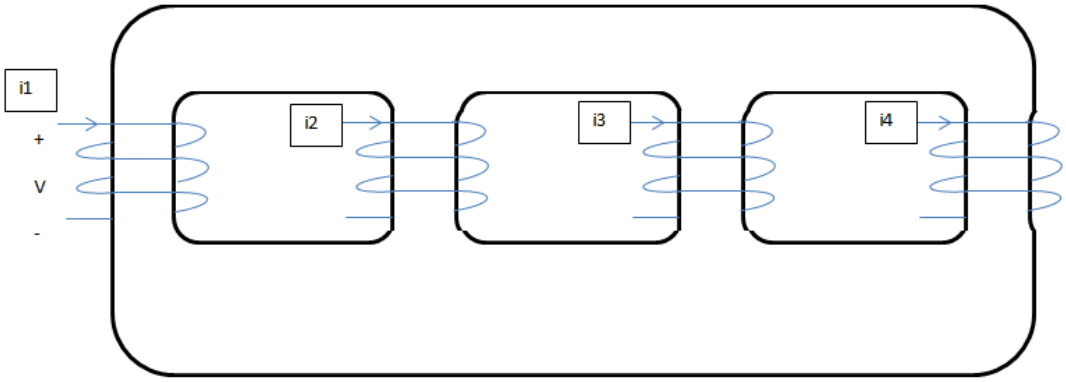
Q3: Two inductors with inductance L_1 and L_2 are connected in series in a circuit and are mutually coupled. Find the expression of combined voltage across both inductors and the equivalent inductance if:

a) Both inductors have the dot on the same side [5]
b) Both inductors have the dot on the opposite side [5]

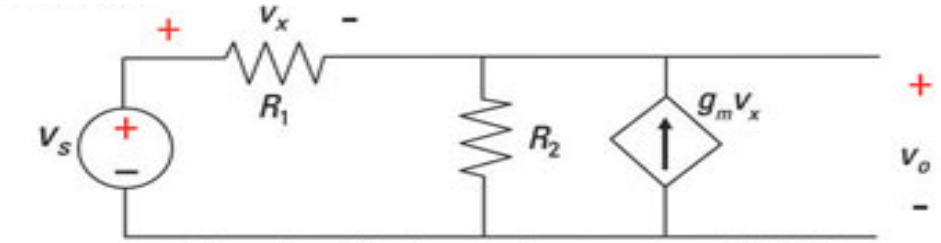
(Drawing the separate diagrams and then applying analysis may help).

Q4: The figure below shows four windings on a magnetic flux-conducting core. Using different shapes, establish polarity markings for the windings.

Note: Do give the key (for each shape along with the coil number) to get marks! [10]



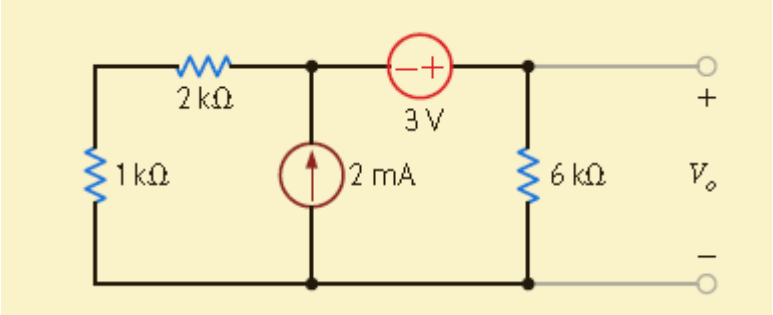
Q5: Consider the circuit given below.



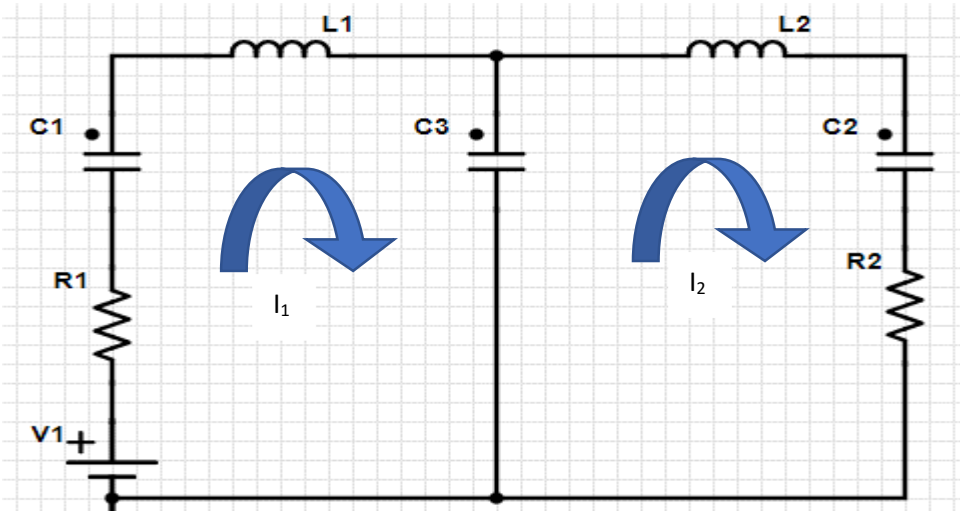
a) Which of the two sources above can be simplified using source transformation? [2]

b) Apply the source transformation to simplify the circuit. [3]

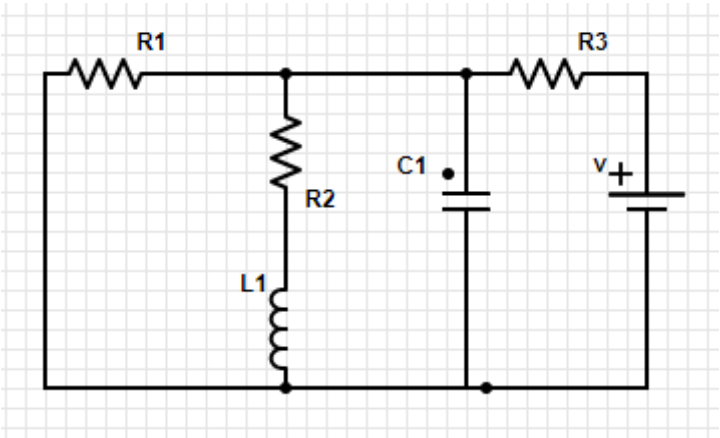
Q6: Calculate V_o for the circuit given below. [10]



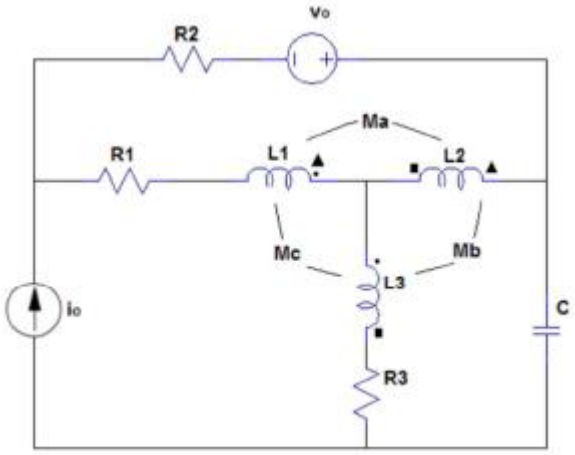
Q7: For the circuit given below, write the loop equations for I_1 and I_2. [10]



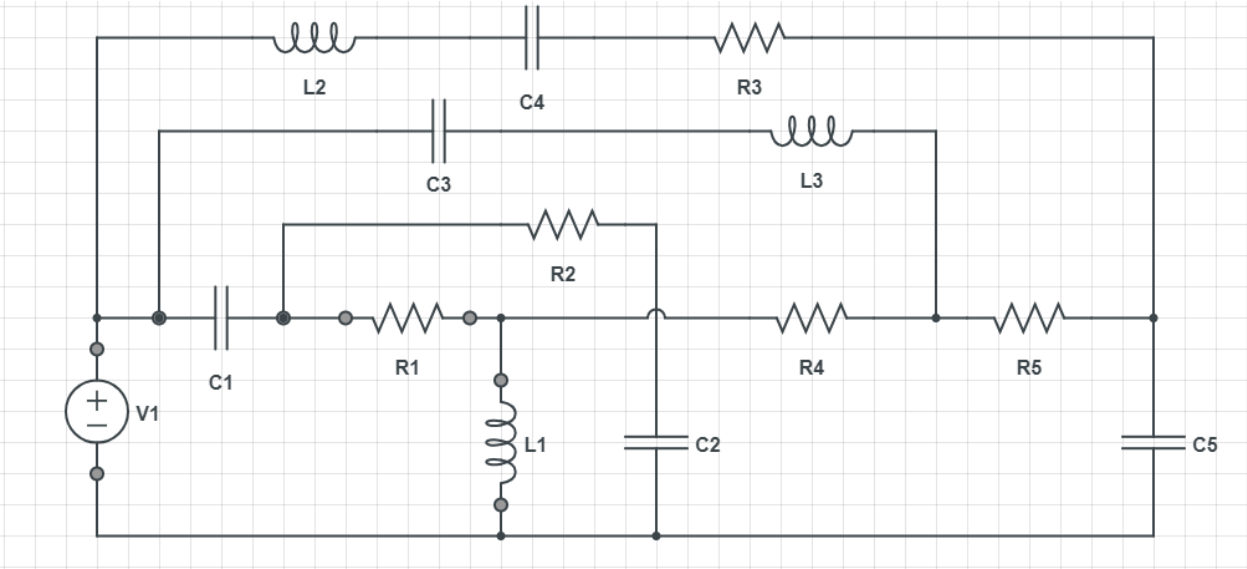
Q8: For the circuit given below, identify the number of nodes and write the set of nodal equations. [10]



Q9: Write independent KVL equations for the circuit given below (choose appropriate loops and loop current variables yourself). [15]



Q10: Consider the circuit given below.



a. Identify the number of nodes and mark them on the circuit [1]
b. Identify the number of equations that will be obtained in performing Nodal analysis [1]
c. Identify the number of equations that will be obtained in performing Loop analysis1 [1]
d. Draw the graph [5]
e. Draw a tree [2]