ID:	Name:

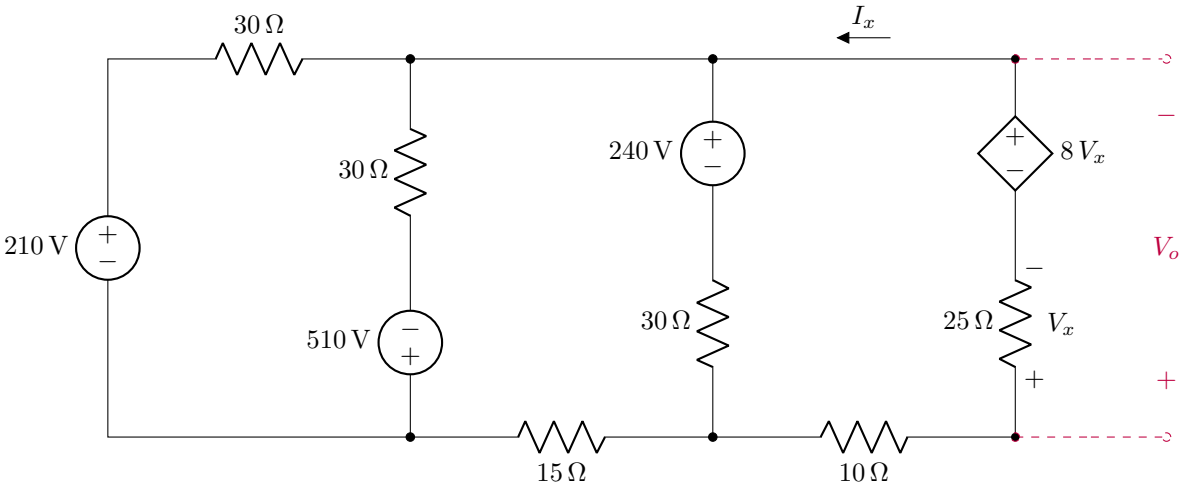
Set **A**

Brac University
Semester: Fall 2023
Course Code: CSE250
Circuits And Electronics

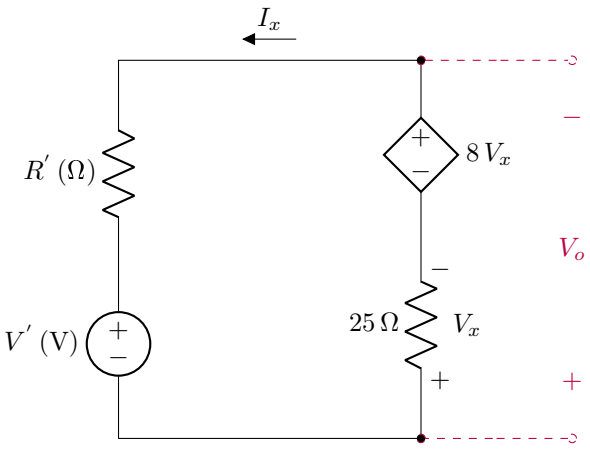
Assessment: *Midterm (Online)*
Duration: 1 hour 10 Minutes
Date: November 9, 2023
Full Marks: 60

- ✓ No washroom breaks. Phones must be turned off. Using/carrying any notes during the exam is not allowed.
- ✓ All **4 questions** are compulsory. Marks allotted for each question are mentioned beside each question.
- ✓ Write your answers inside the indicated boxes (where applicable). If you run out of room, continue on the back page.
- ✓ Symbols have their usual meanings.

♢ Question 1 of 4 *[CO2] [15 marks]*



Circuit 1



Circuit 2

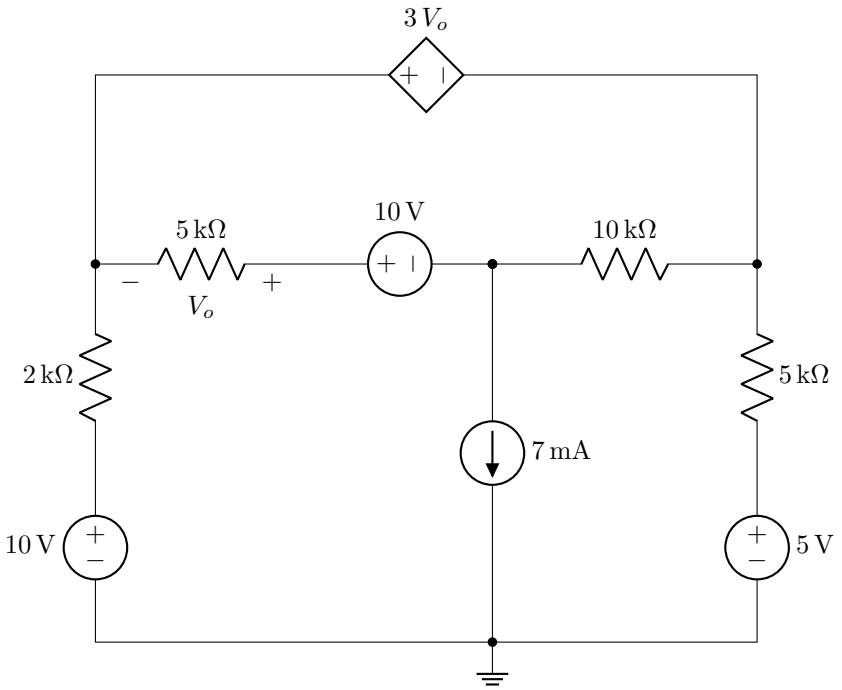
Apply Source Transformation to answer the following queries–

(a) ***[8 marks]*** Reduce the *Circuit 1* so that it takes the form of *Circuit 2*. Determine the values of V' and R'.

(b) ***[4 marks]*** Determine the values of V_x and I_x.

(c) ***[3 marks]*** Determine the value of V_o.

♢ Question 2 of 4 *[CO3] [15 marks]*

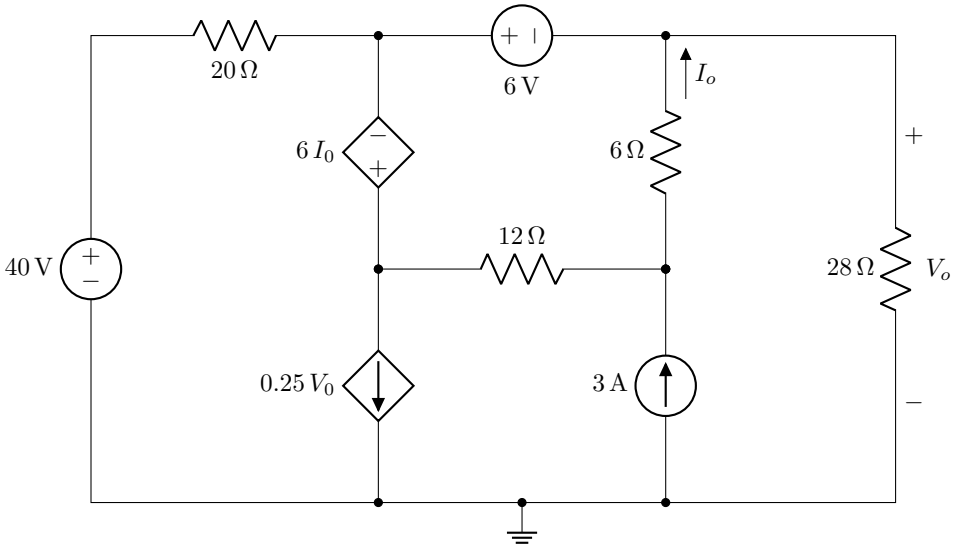


Apply Nodal/Mesh analysis to answer the following questions–

(a) ***[12 marks]*** Find all the node voltages/mesh currents in the circuit shown above. Note that, depending on the analysis method you are applying, you have to determine either the mesh currents or the node voltages, not both.
[A hint: derive all the equations at first, as correct formation of the nodal/mesh equations bear majority of the marks. Proceed to solve then.]

(b) ***[3 marks]*** Determine the power of the 3 V_o dependent voltage source (with appropriate ± sign). Also mention, whether the source is supplying or consuming the power.

♢ Question 3 of 4 *[CO3] [15 marks]*



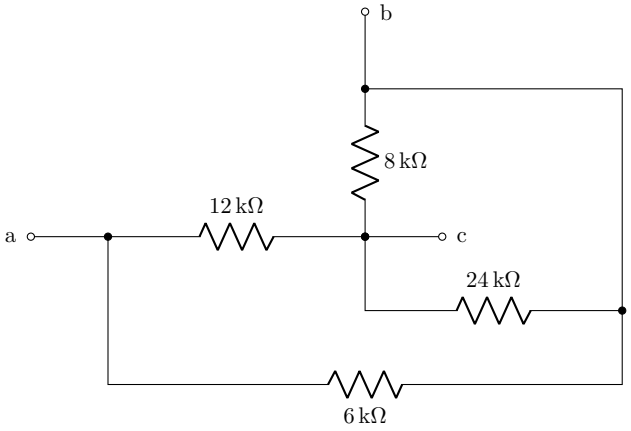
Apply Nodal/Mesh analysis to answer the following questions–

(a) ***[12 marks]*** Find all the node voltages/mesh currents in the circuit shown above. Note that, depending on the analysis method you are applying, you have to determine either the mesh currents or the node voltages, not both.
[A hint: derive all the equations at first, as correct formation of the nodal/mesh equations bear majority of the marks. Proceed to solve then.]

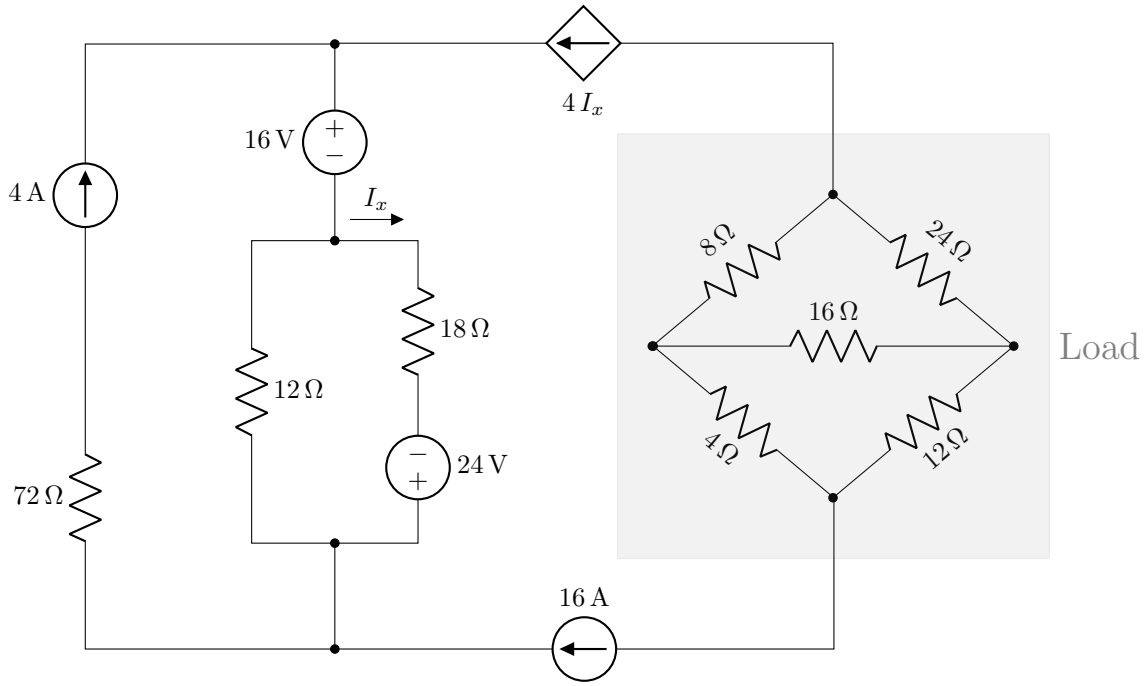
(b) ***[3 marks]*** Determine V_o and I_o.

♢ Question 4 of 4 *[CO3] [15 marks]*

(a) ***[6 marks]*** For the circuit on the right, determine the equivalent resistances R_{ac} and R_{ab}. *(You must specify series-parallel combinations)*



(b) ***[3 marks]*** For the circuit shown below, determine the value of I_x.



(c) ***[6 marks]*** For the following circuit, if the I vs. V has the relationship shown, determine the value of the unknown resistance X.