LUMS
A Not-for-Profit University

School of Science and Engineering

EE 240 Circuits-I

ASSIGNMENT 3

Due Date: 1 pm, Tuesday, October 24, 2024.
Format: 5 problems, for a total of 100 marks
Instructions:

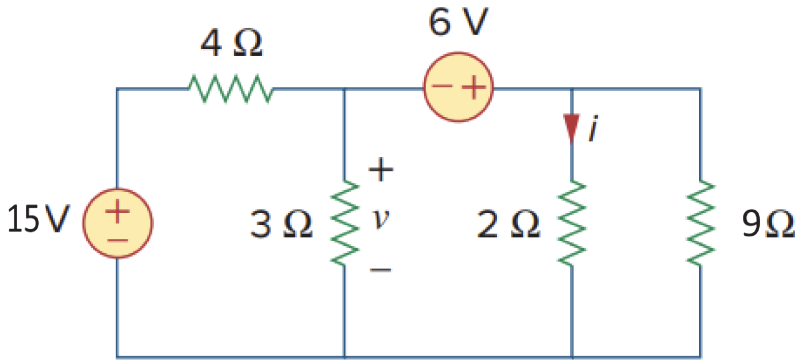
- You are allowed to collaborate with your peers but copying your colleague's solution is strictly prohibited. This is not a group assignment. Each student must submit his/her own assignment.
- Solve the assignment on blank A4 sheets and staple them before submitting.
- Submit in-class or in the dropbox labeled EE-240 outside the instructor's office.
- **Write your name and roll no. on the first page.**
- Feel free to contact the instructor or the teaching assistants if you have any concerns.

- You represent the most competent individuals in the country, do not let plagiarism come in between your learning. In case any instance of plagiarism is detected, the disciplinary case will be dealt with according to the university's rules and regulations.
- We require you to acknowledge any use or contributions from generative AI tools. Include the following statement to acknowledge the use of AI where applicable.

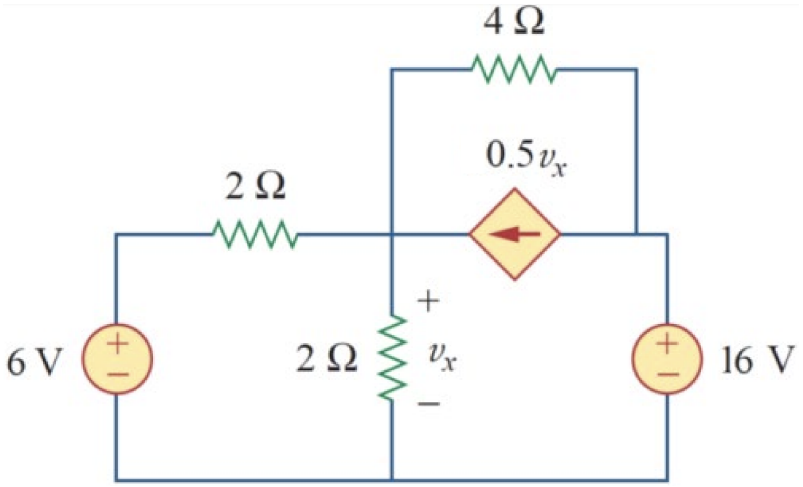
  I have used [insert Tool Name] to [write, generate, plot or compute; explain specific use of generative AI] [number of times].

Problem 1 (20 marks)

(a) **[10 marks]** Given the circuit below, find the value of i by using source transformation. We require you to use source transformation multiple times to reduce the circuit into a single-loop circuit.

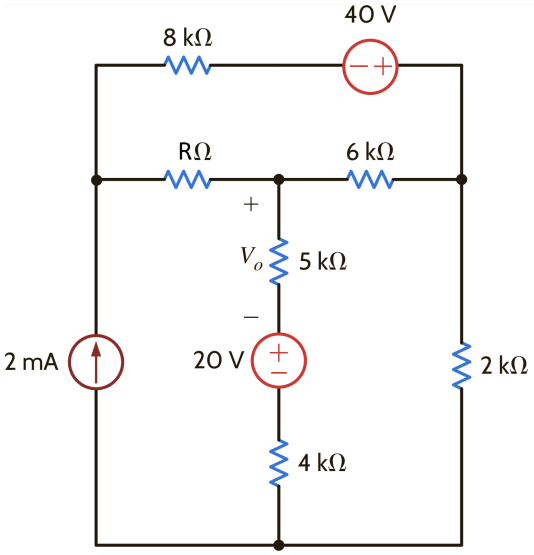


(b) **[10 marks]** Determine the voltage v_x in the following circuit using the source transformation technique.



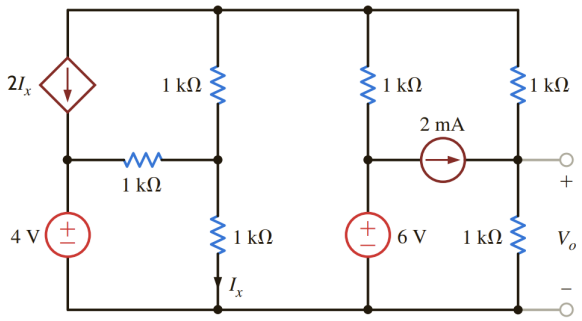
Problem 2 (20 marks)

Determine the Thévenin equivalent circuit across the load ($5k\Omega$ resistor) for the given circuit, and find the value of R for which maximum power is transferred to the load.

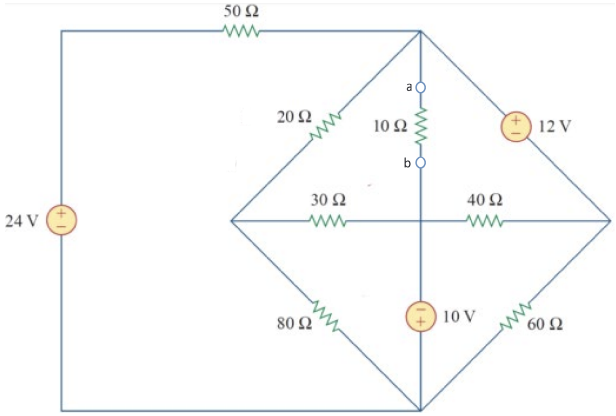


Problem 3 (30 marks)

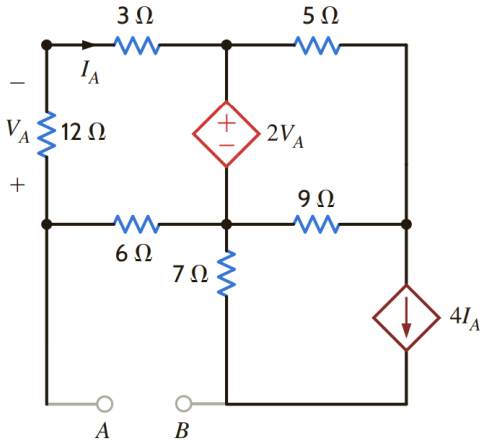
(a) **[10 marks]** Use Thévenin's theorem to find V_o in the following network.



(b) **[10 marks]** Find the Thévenin equivalent circuit across the terminals a and b.



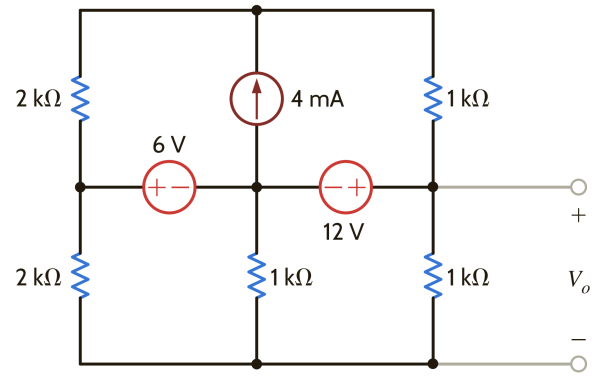
(c) **[10 marks]** Find the Thévenin equivalent circuit across the terminals a and b.



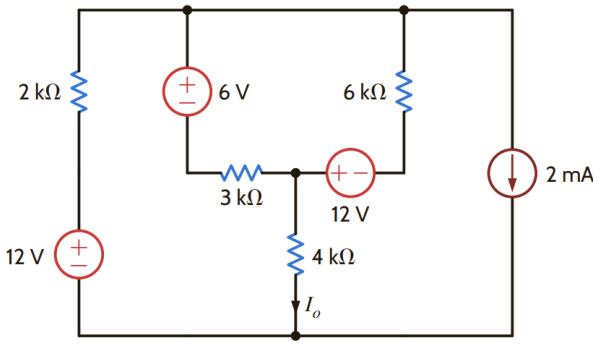
Problem 4 (20 marks)

Use superposition to find the following in the circuits below:

(a) **[10 marks]** V_o.



(b) **[10 marks]** I_o.



Problem 5 (10 marks)

Determine the Norton equivalent circuit across the terminals a and b for the given circuit.