ID:	Name:

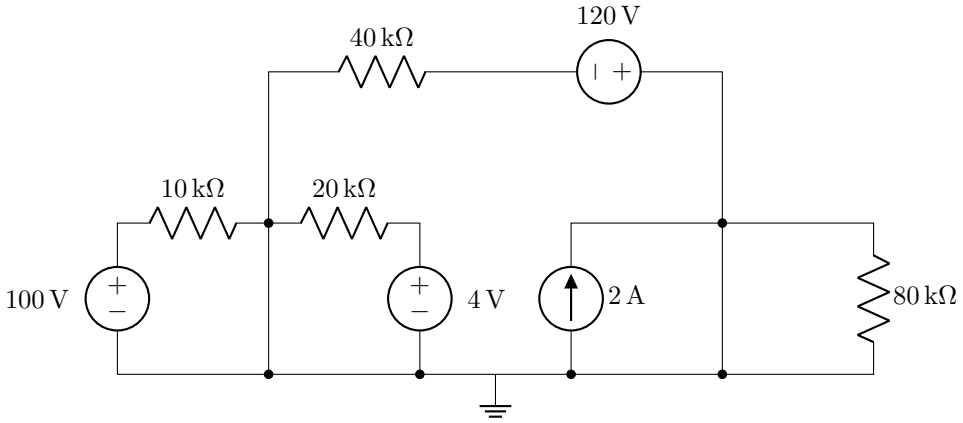
Brac University
Semester: Spring 2023
Course Code: CSE250
Circuits And Electronics
Section: 05
Faculty: SHS

Set
A

Assessment: *Quiz 1*
Duration: 30 minutes
Date: April 18, 2023
Full Marks: 20

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

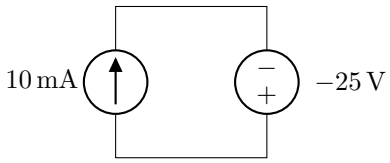
■ Question 1 of 4 *[CO1] [2 marks]*



How many nodes are there in this circuit (including the ground node)? All of the nodes must be drawn and identified in the above circuit.

Solution: 4 nodes

■ Question 2 of 4 *[CO2] [6 marks]*



(a) ***[2 marks]*** What is the power of the current source (with appropriate ± sign and unit)?†

Solution: −250 mW

(b) ***[1 mark]*** Based on your answer in (a), is the current source supplying/consuming power?

Solution: Supplying

(c) ***[2 marks]*** What is the power of the voltage source (with appropriate ± sign and unit)?†

Solution: +250 mW

(d) ***[1 mark]*** Based on your answer in (c), is the voltage source supplying/consuming power?

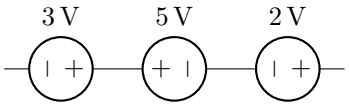
Solution: Consuming

†Mark distribution: 1 mark for the sign, 0.5 mark for the value and 0.5 mark for the unit

■ Question 3 of 4 *[CO2] [2 marks]*

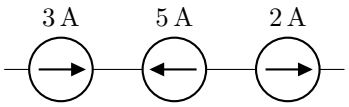
Which of the following circuits are illegal connection? For each of the circuits below, put a checkmark (✓) on either "Legal" or "Illegal". Explain why in each case.

(a) *[½ mark]* The following connection is: √ **Legal** ◯ Illegal



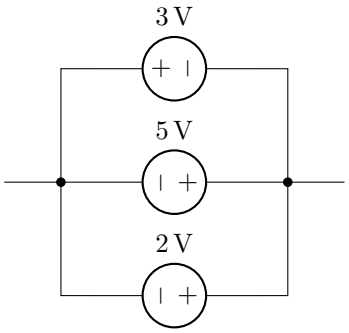
Solution: Because voltage sources can be connected in series.

(b) *[½ mark]* The following connection is: ◯ Legal √ **Illegal**



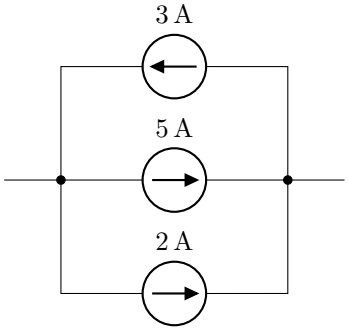
Solution: Because current sources can ***not*** be connected in series.

(c) *[½ mark]* The following connection is: ◯ Legal √ **Illegal**



Solution: Because voltage sources can ***not*** be connected in parallel.

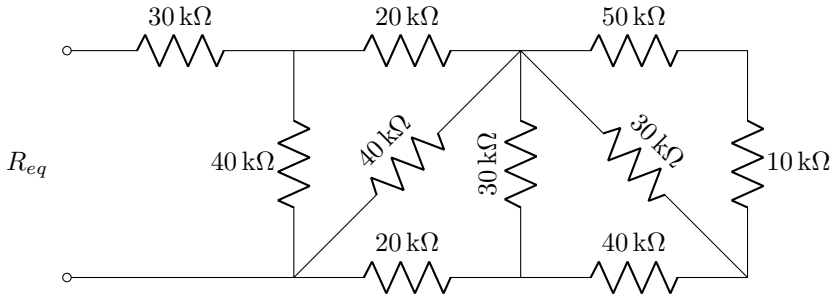
(d) *[½ mark]* The following connection is: √ **Legal** ◯ Illegal



Solution: Because current sources can be connected in parallel.

■ Question 4 of 4 *[CO3] [10 marks]*

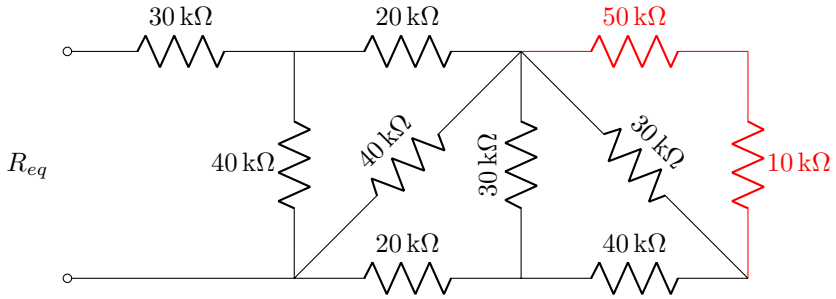
What is the value of equivalent resistance R_{eq}? *[Must show step by step procedure of finding R_{eq}]*



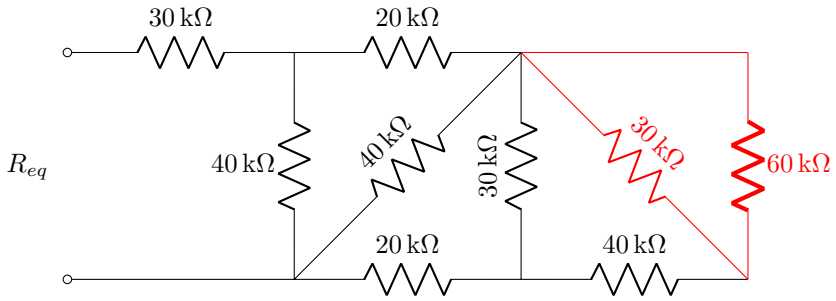
Solution: 50 kΩ

Solution:

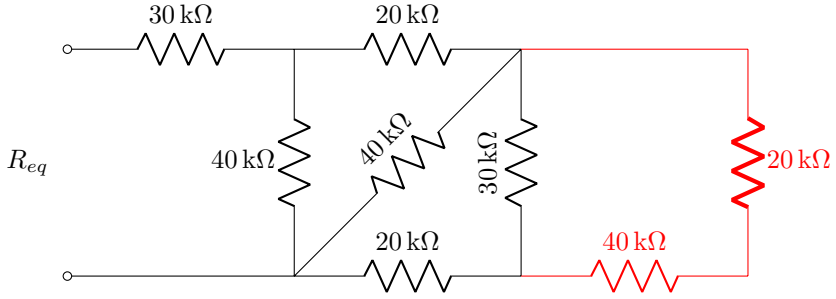
- Given circuit:



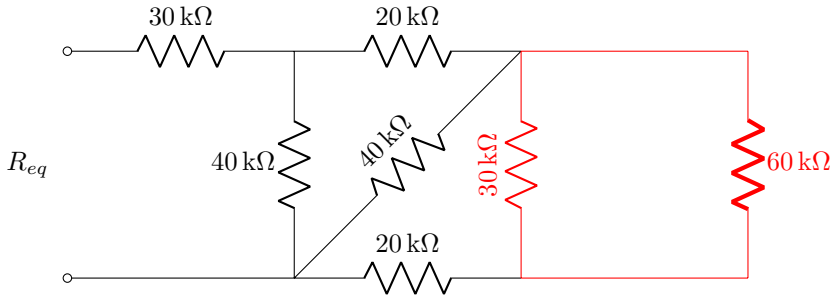
- 50 kΩ and 10 kΩ in series $\Rightarrow (50 + 10)\,\text{k}\Omega = 60\,\text{k}\Omega$:



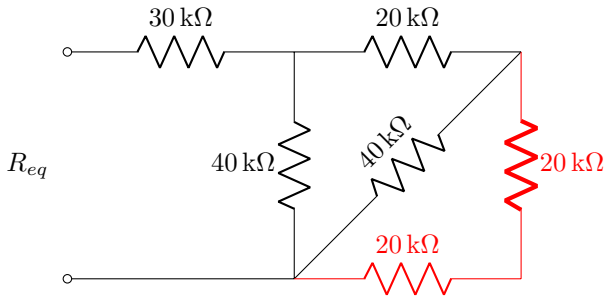
- 60 kΩ and 30 kΩ in parallel $\Rightarrow \left(\frac{60\times30}{60+30}\right)\,\text{k}\Omega = 20\,\text{k}\Omega$:



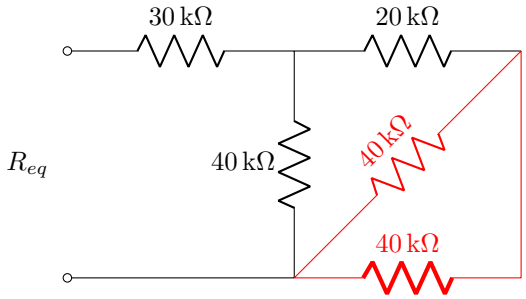
- $40\,\text{k}\Omega$ and $20\,\text{k}\Omega$ in series $\Rightarrow (40+20)\,\text{k}\Omega = 60\,\text{k}\Omega$:



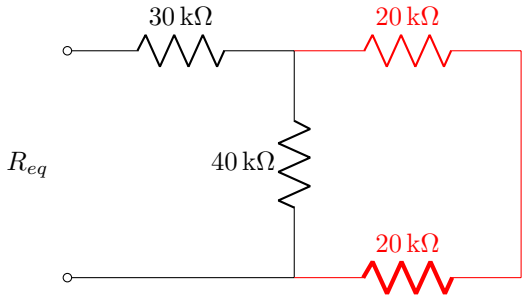
- $60\,\text{k}\Omega$ and $30\,\text{k}\Omega$ in parallel $\Rightarrow \left(\frac{60\times30}{60+30}\right)\,\text{k}\Omega = 20\,\text{k}\Omega$:



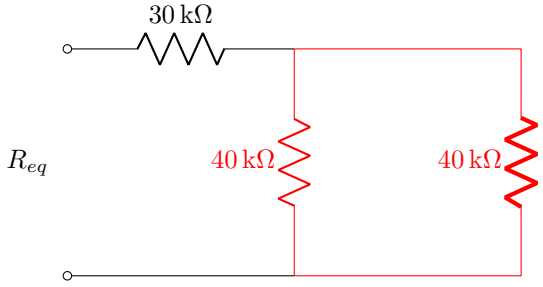
- $20\,\text{k}\Omega$ and $20\,\text{k}\Omega$ in series $\Rightarrow (20+20)\,\text{k}\Omega = 40\,\text{k}\Omega$:



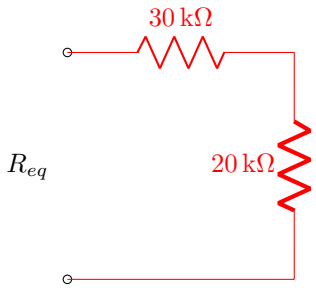
- $40\,\text{k}\Omega$ and $40\,\text{k}\Omega$ in parallel $\Rightarrow \left(\frac{40\times40}{40+40}\right)\,\text{k}\Omega = 20\,\text{k}\Omega$:



- $20\,\text{k}\Omega$ and $20\,\text{k}\Omega$ in series $\Rightarrow (20+20)\,\text{k}\Omega = 40\,\text{k}\Omega$:



- $40\,\text{k}\Omega$ and $40\,\text{k}\Omega$ in parallel $\Rightarrow \left(\frac{40\times40}{40+40}\right)\,\text{k}\Omega = 20\,\text{k}\Omega$:



- $20\,\text{k}\Omega$ and $30\,\text{k}\Omega$ in series $\Rightarrow (20+30)\,\text{k}\Omega = 50\,\text{k}\Omega$: