

ID:

Name:

**Brac University**

Semester: Spring 2023

Course Code: CSE250

Circuits And Electronics

Section: 05

Faculty: SHS

Set

A

Assessment: *Quiz 1*

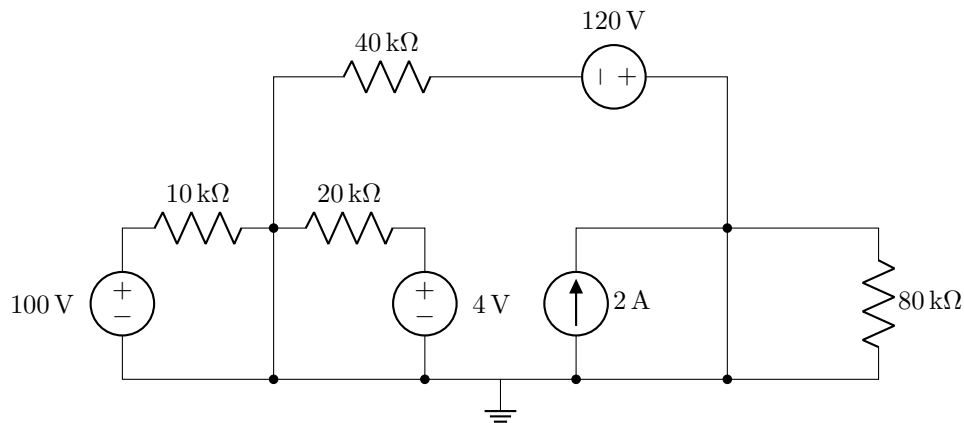
Duration: 30 minutes

Date: February 8, 2023

Full Marks (incl. bonus 0): 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.
- ✓ Bonus questions are indicated as “(**bonus**)” along with allotted marks.
- ✓ Write your answers inside the indicated boxes. In case you run out of room for an answer, please continue on the back of the page.

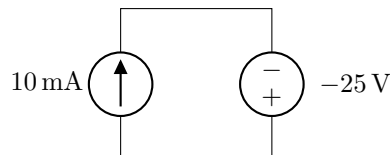
■ Question 1 of 4 [CO1] [2 marks]



How many nodes are there in this circuit (including the ground node)?

Solution: 4 nodes

■ Question 2 of 4 [CO2] [6 marks]



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

Solution: +250 mW

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

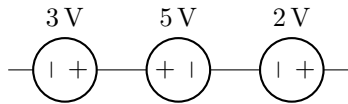
Solution: Consuming

[†]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]

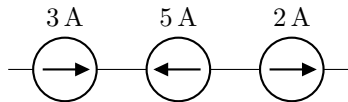
Which of the following circuits are illegal connection? For each of the circuits below, put a checkmark (✓) on either “Legal” or “Illegal”. Explain why in each case.

- (a) [$\frac{1}{2}$ mark] The following connection is: ☒ **Legal** ☐ **Illegal**



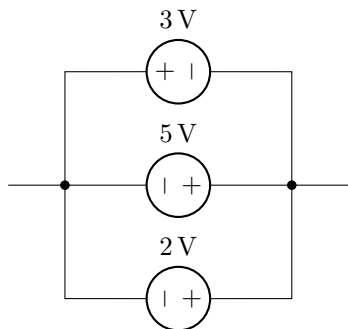
Solution: Because voltage sources can be connected in series.

- (b) [$\frac{1}{2}$ mark] The following connection is: ☐ **Legal** ☒ **Illegal**



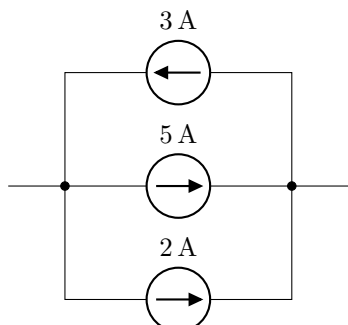
Solution: Because current sources can *not* be connected in series.

- (c) [$\frac{1}{2}$ mark] The following connection is: ☐ **Legal** ☒ **Illegal**



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

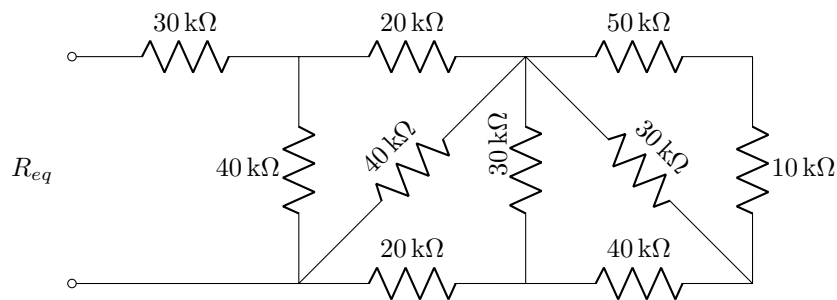
- (d) [$\frac{1}{2}$ mark] The following connection is: ☒ **Legal** ☐ **Illegal**



Solution: Because current sources can be connected in parallel.

■ Question 4 of 4 [CO3] [10 marks]

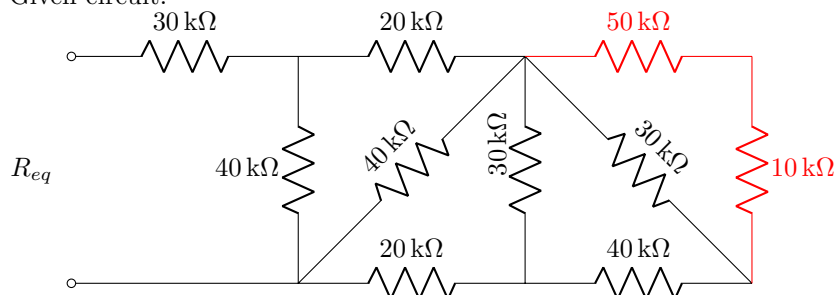
What is the value of equivalent resistance R_{eq} ? [Must show step by step procedure of finding R_{eq}]



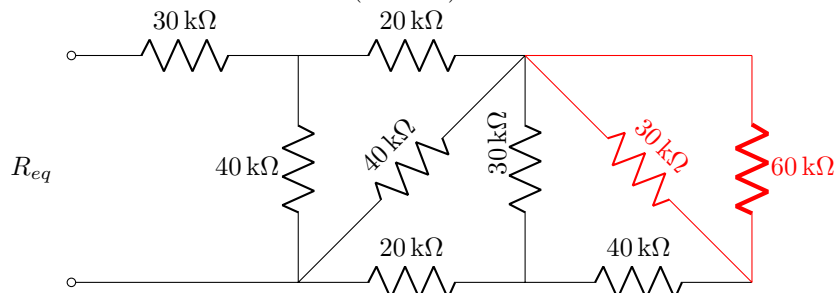
Solution: 50 kΩ

Solution:

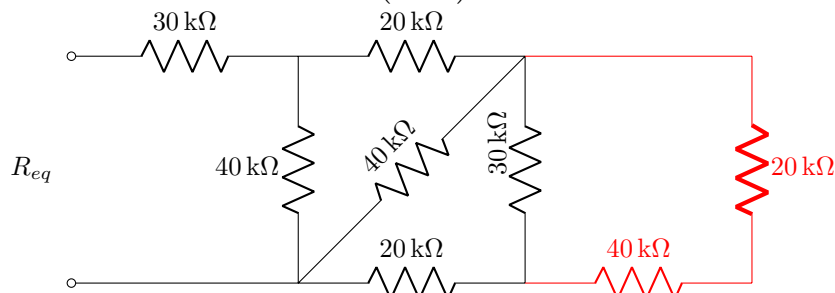
- Given circuit:



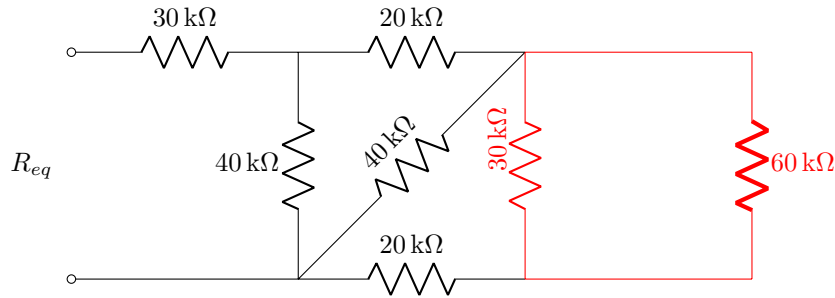
- 50 kΩ and 10 kΩ in series $\Rightarrow (50 + 10) \text{ k}\Omega = 60 \text{ k}\Omega$:



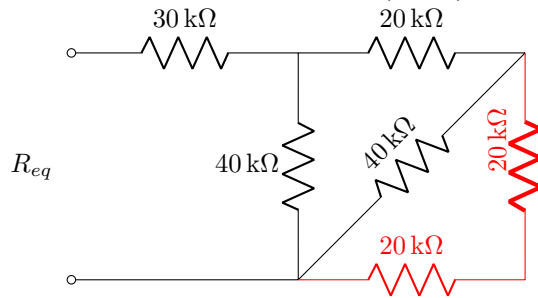
- 60 kΩ and 30 kΩ in parallel $\Rightarrow \left(\frac{60 \times 30}{60 + 30} \right) \text{ k}\Omega = 20 \text{ k}\Omega$:



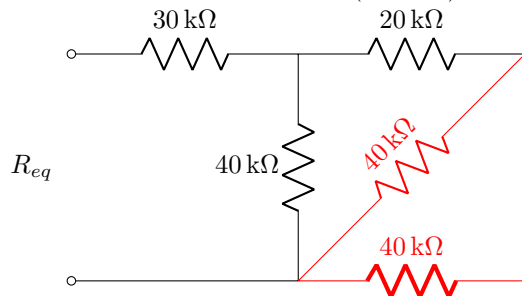
- $40\text{ k}\Omega$ and $20\text{ k}\Omega$ in series $\Rightarrow (40 + 20)\text{ k}\Omega = 60\text{ k}\Omega$:



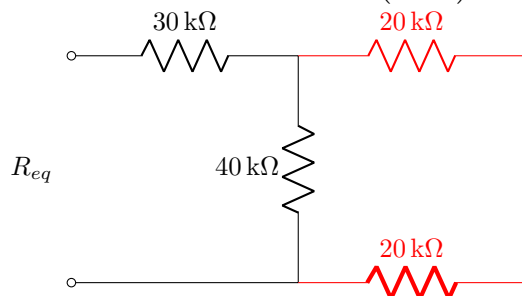
- $60\text{ k}\Omega$ and $30\text{ k}\Omega$ in parallel $\Rightarrow \left(\frac{60 \times 30}{60 + 30}\right)\text{ k}\Omega = 20\text{ k}\Omega$:



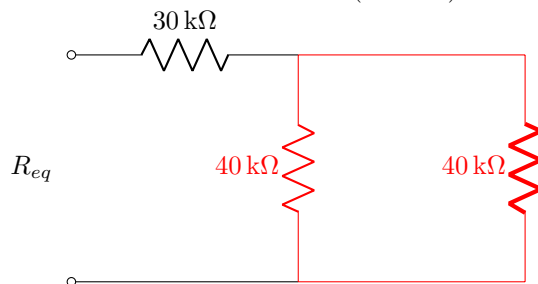
- $20\text{ k}\Omega$ and $20\text{ k}\Omega$ in series $\Rightarrow (20 + 20)\text{ k}\Omega = 40\text{ k}\Omega$:



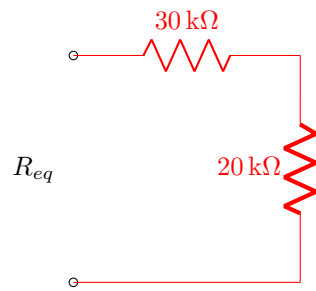
- $40\text{ k}\Omega$ and $40\text{ k}\Omega$ in parallel $\Rightarrow \left(\frac{40 \times 40}{40 + 40}\right)\text{ k}\Omega = 20\text{ k}\Omega$:



- $20\text{ k}\Omega$ 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 $\Rightarrow \left(\frac{40 \times 40}{40 + 40}\right)\text{ k}\Omega = 20\text{ k}\Omega$:



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

