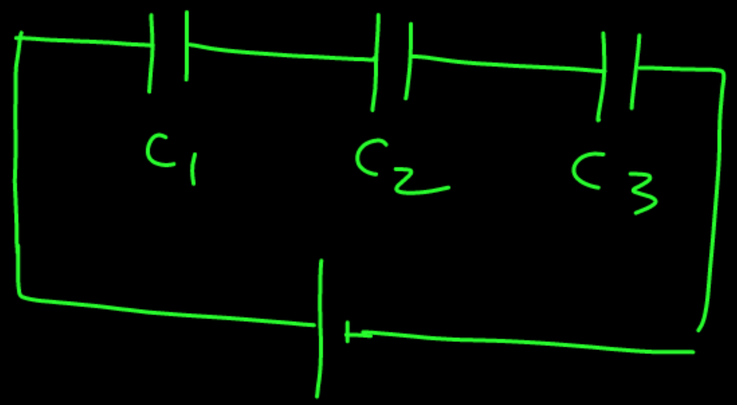

समस्त बिहार, भरेगा हुंकार
HUNKAR
2025
में आपका स्वागत हैं

⊛ Series capacitor

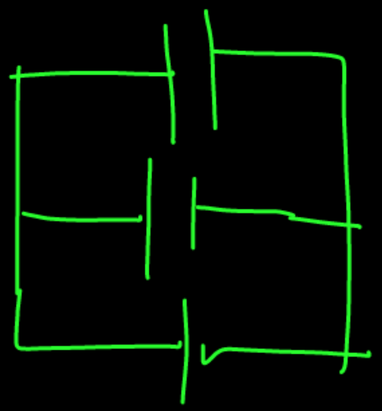
→ Q Charge Sa.



$$\frac{1}{C_e} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$$

⊛ Parallel

P.d Sam.



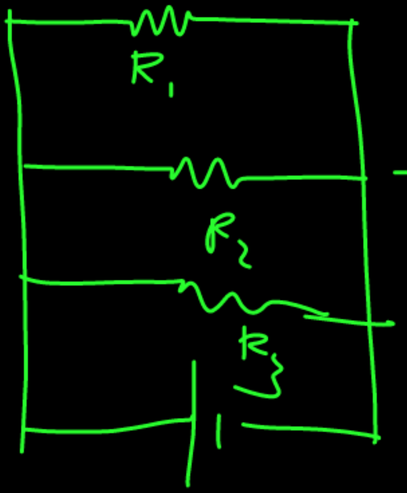
$$C_{eq} = C_1 + C_2 + C_3$$

Resistor

⊛ current same.

$$R_{eq} = R_1 + R_2 + R_3$$

⊛



P.d. Same

$$\frac{1}{R_e} = \frac{1}{R_1} + \frac{1}{R_2} - -$$

HUNKAR 2025

VIDYAKUL

PHYSICS

JP UJALA Sir

VIDYAKUL

अध्याय 03

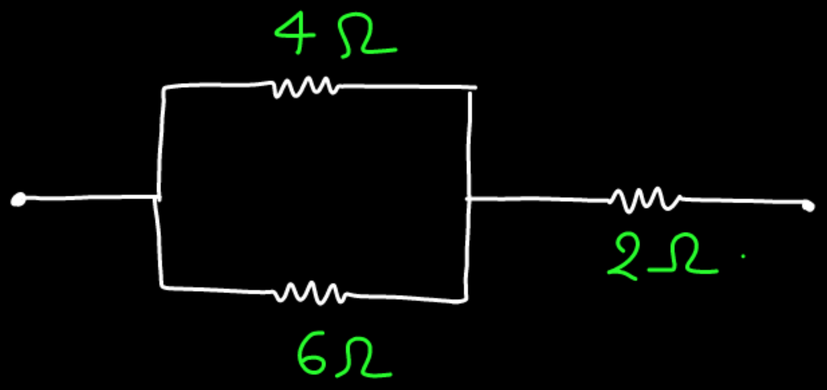
Wheat Stone Bridge

& Combination of Resistors
प्रतिरोधकों का समूह

आज का टॉपिक

⊛ Problems based of combination of Resistor
प्रतिरोधकों के समूह पर आधारित प्रश्न

i)



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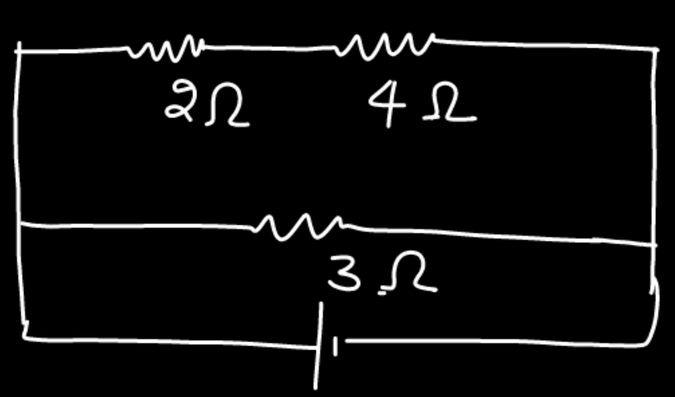
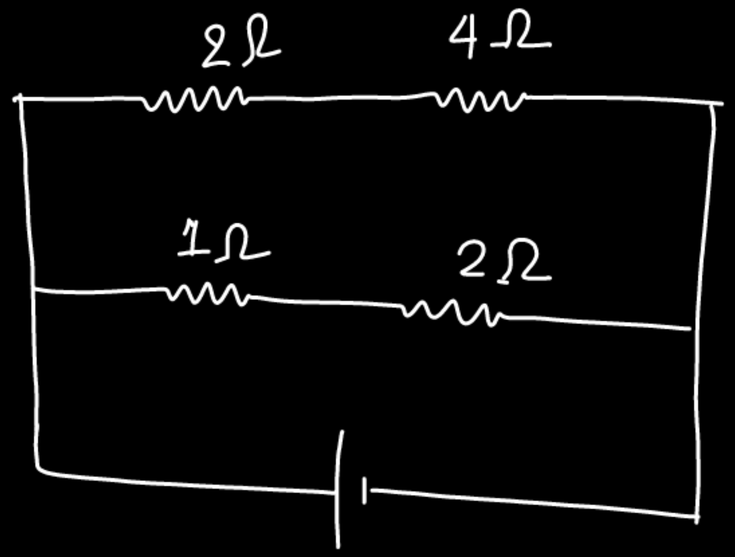
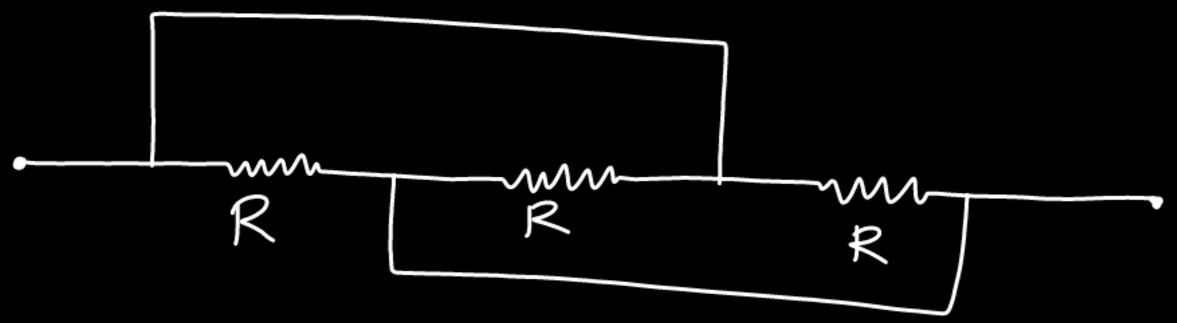


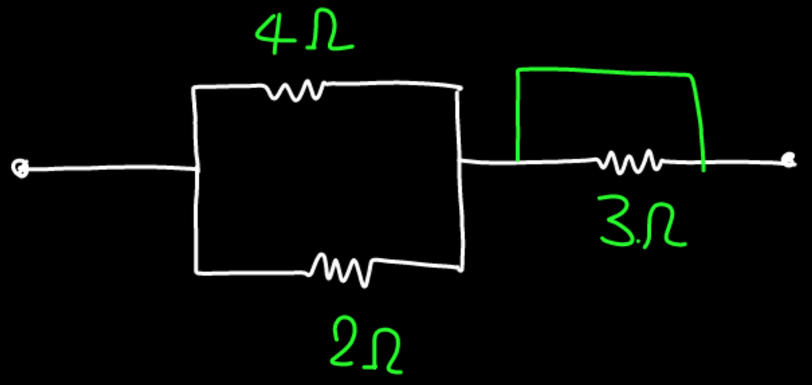
(iii)



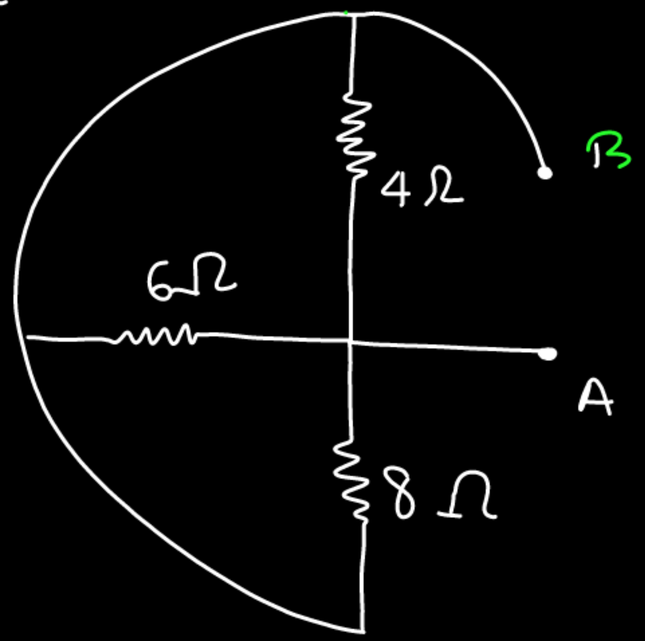
iv)



v)



(VI)



WHEAT STONE BRIDGE

It is an arrangement of four resistors used for measuring resistance of one of them in terms of other three. It was devised by sir Charles wheatstone a British physicist in 1833.

In this circuit there are four resistors connected as shown in circuit there is a bridge element connected between them which is a galvanometer.

There are two types of wheatstone bridge.

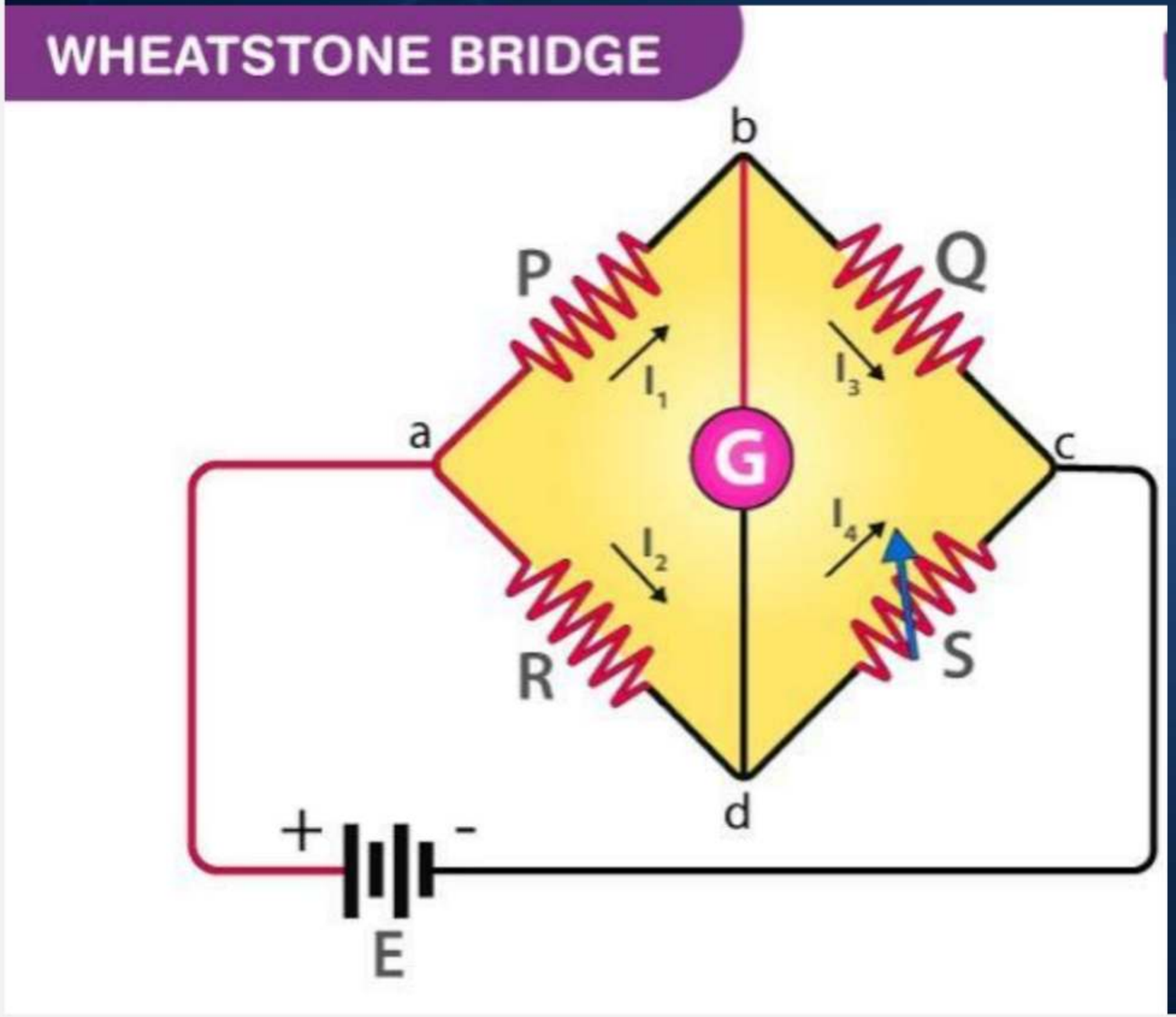
1. Balanced wheatstone bridge
2. Unbalanced wheatstone bridge

यह चार प्रतिरोधकों का ऐसा संयोजन है जिस के उपयोग से इनमें से एक प्रतिरोधक का प्रतिरोध बाकी तीन प्रतिरोधकों के प्रतिरोध के पद में ज्ञात कर सकते हैं।

इस परिपथ में चार प्रतिरोधक जुड़े रहते हैं तथा इनके बीच एक सेतु अवयव जुड़ा रहता है जो एक गैल्वेनोमीटर होता है।

यह दो प्रकार का होता है।

WHEAT STONE BRIDGE



BALANCED WHEATSTONE BRIDGE

संतुलित व्हीट स्टोन ब्रिज

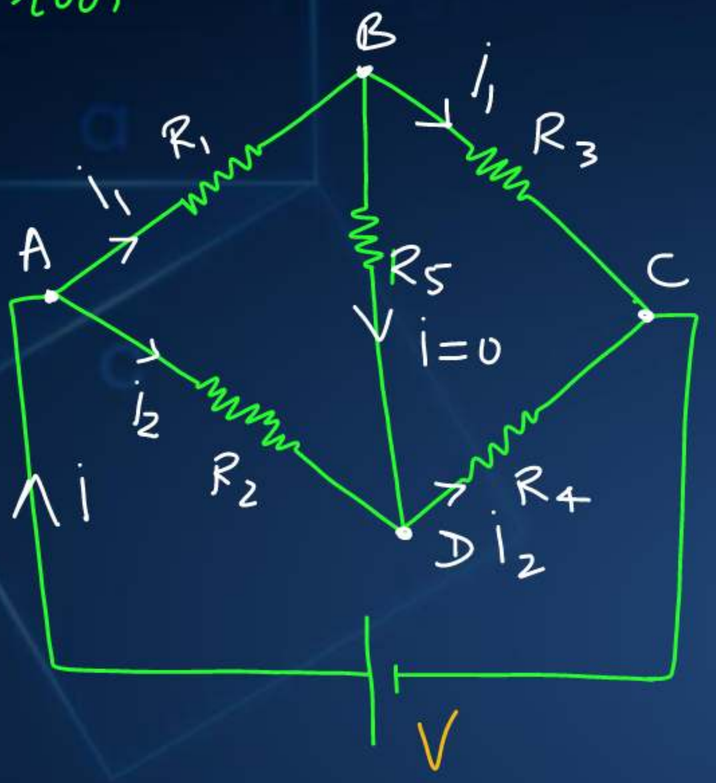
The wheatstone bridge in which there is no current passes from bridge element is called balanced wheatstone bridge.

ऐसा व्हीटस्टोन ब्रिज जिसमें सेतु अवयव से कोई धारा नहीं गुजरती हो उसे संतुलित व्हीटस्टोन ब्रिज कहते हैं।

Condition for balanced wheatstone bridge.

संतुलित व्हीटस्टोन ब्रिज का शर्त

Proof



$$\frac{V_A - V_B}{V_B - V_C} = \frac{i_1 R_1}{i_1 R_3} \quad \text{-(i)}$$

$$\frac{V_A - V_D}{V_D - V_C} = \frac{i_2 R_2}{i_2 R_4} \quad \text{-(iii)}$$

Divide

$$\frac{V_A - V_B}{V_B - V_C} = \frac{R_1}{R_3} \quad \text{--(V)}$$

$$\frac{V_A - V_D}{V_D - V_C} = \frac{R_2}{R_4} \quad \text{--(VI)}$$

चूंकि R_5 से धारा शून्य है इसलिए

Since current through R_5 is zero so

$$V_B = V_D$$

Putting V_B on the Place of V_D in eqn (VI)

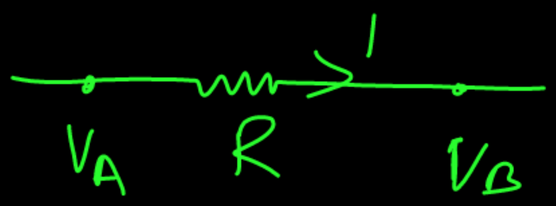
$$\frac{V_A - V_B}{V_B - V_C} = \frac{R_2}{R_4} \quad \text{--(VII)}$$

From eqn (V) & (VII)

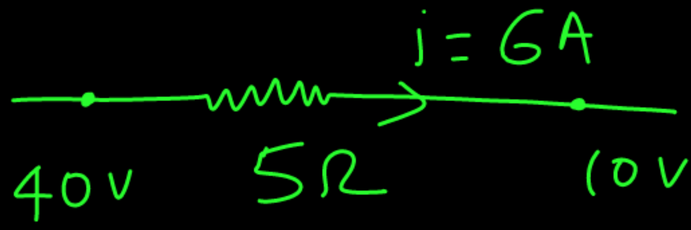
$$\frac{R_1}{R_3} = \frac{R_2}{R_4}$$

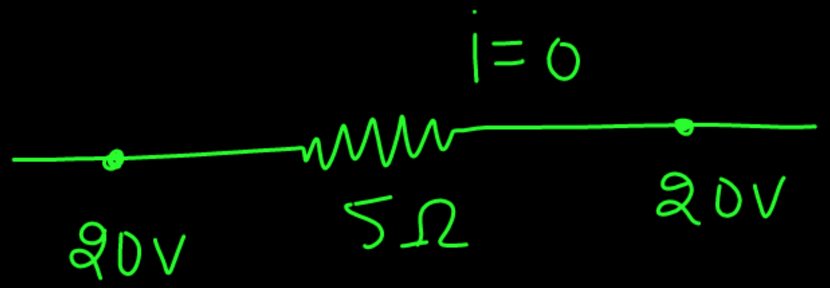
$$\boxed{\frac{R_1}{R_2} = \frac{R_3}{R_4}}$$

Proved



$$V_A - V_B = iR$$





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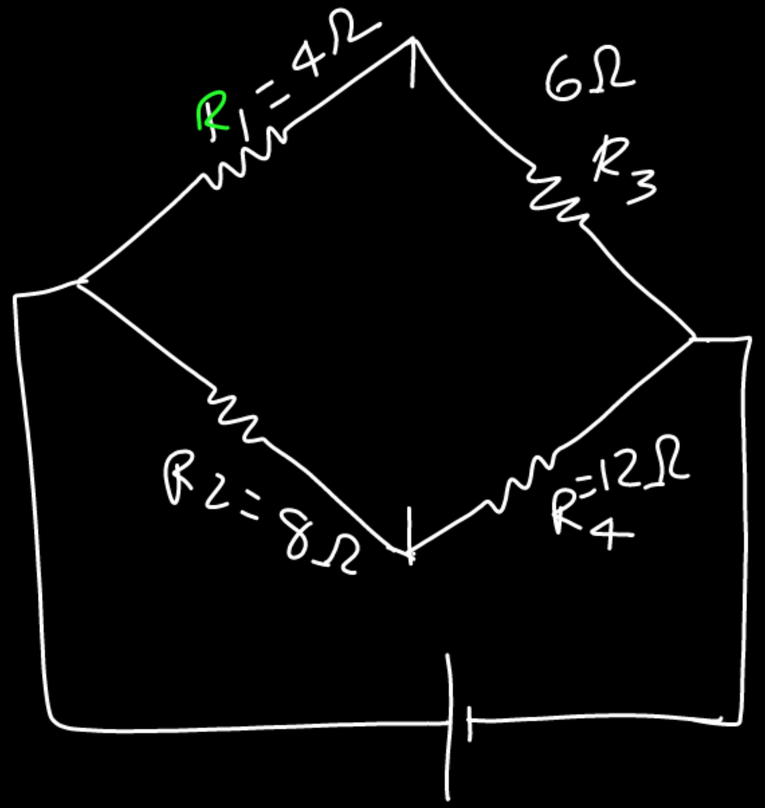
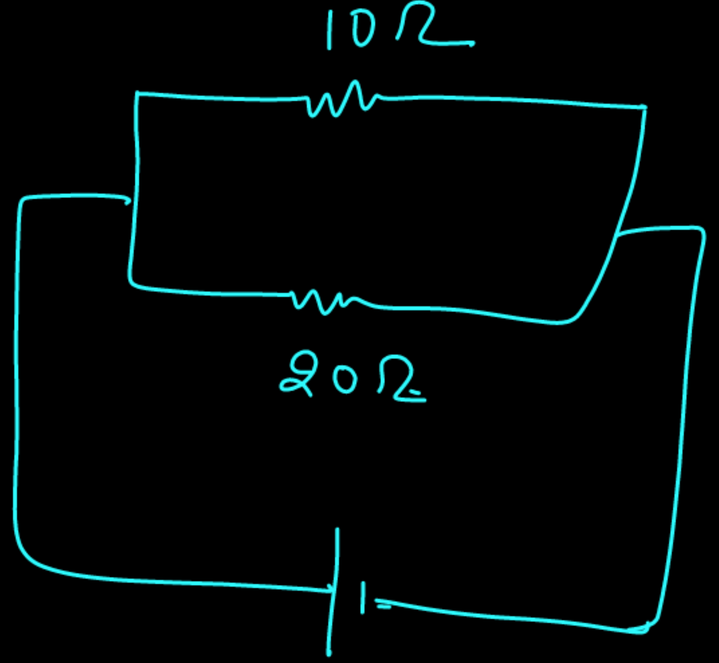




$$\frac{1}{R_e} = \frac{1}{10} + \frac{1}{20}$$

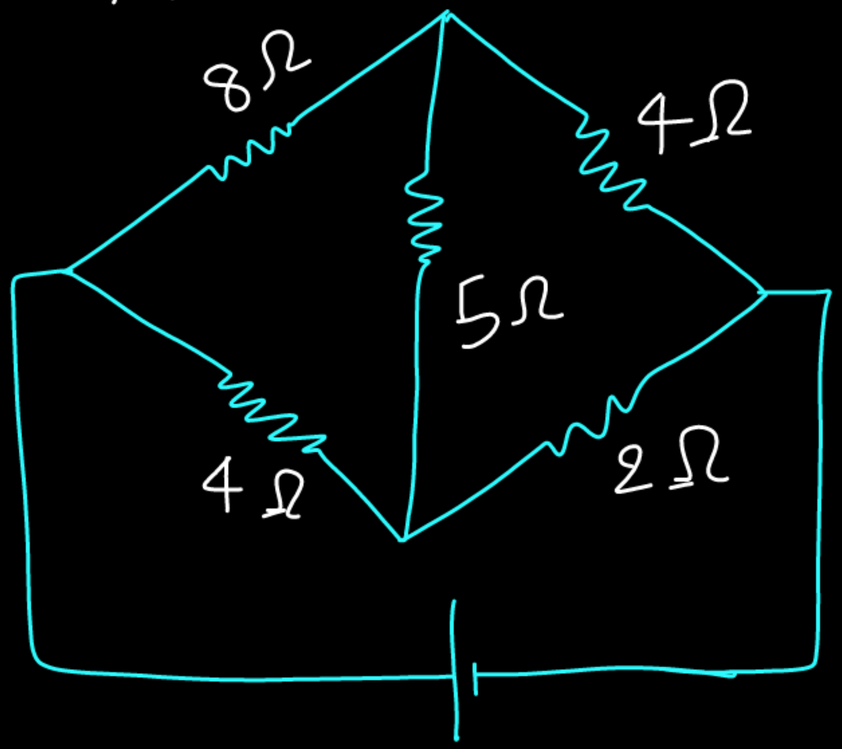
$$\frac{1}{R_e} = \frac{2+1}{20}$$

$$\boxed{R_e = \frac{20}{3}\ \Omega}$$

⊛ HW

Find the Req.

(1)



(11)