BEE1133 Circuit Analysis

Chapter 1C
Basic Concept

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Chapter Description

Aims

This chapter is aimed to:

1. Explain the voltage division and current division
2. Explain the Delta-wye transformation

Expected Outcomes

Student should be able to

1. Simplified the circuit and solved the question related to voltage division and current division
2. Recognize the circuit to be solve using Delta-wye transformstion

References

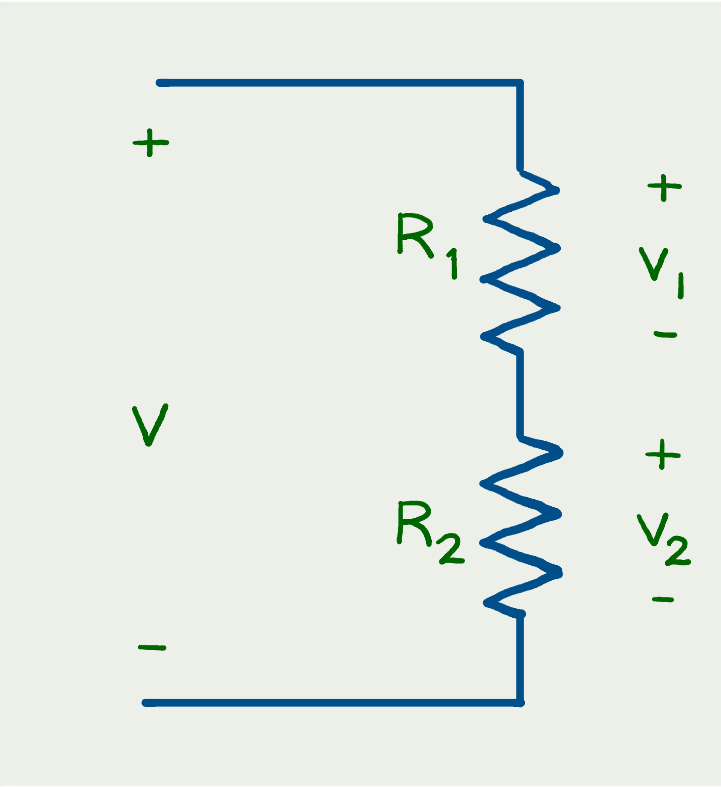
1. C. Alexander and M. Sadiku, “Fundamentals of Electric Circuits”, 4th ed., McGraw-Hill, 2008.
2. J. Nilsson and S. Riedel, “Electric Circuits”, 8th ed., Prentice Hall, 2008.

BASIC CONCEPT

3.1 Principles of voltage division and current division

3.2 Delta-wye transformation

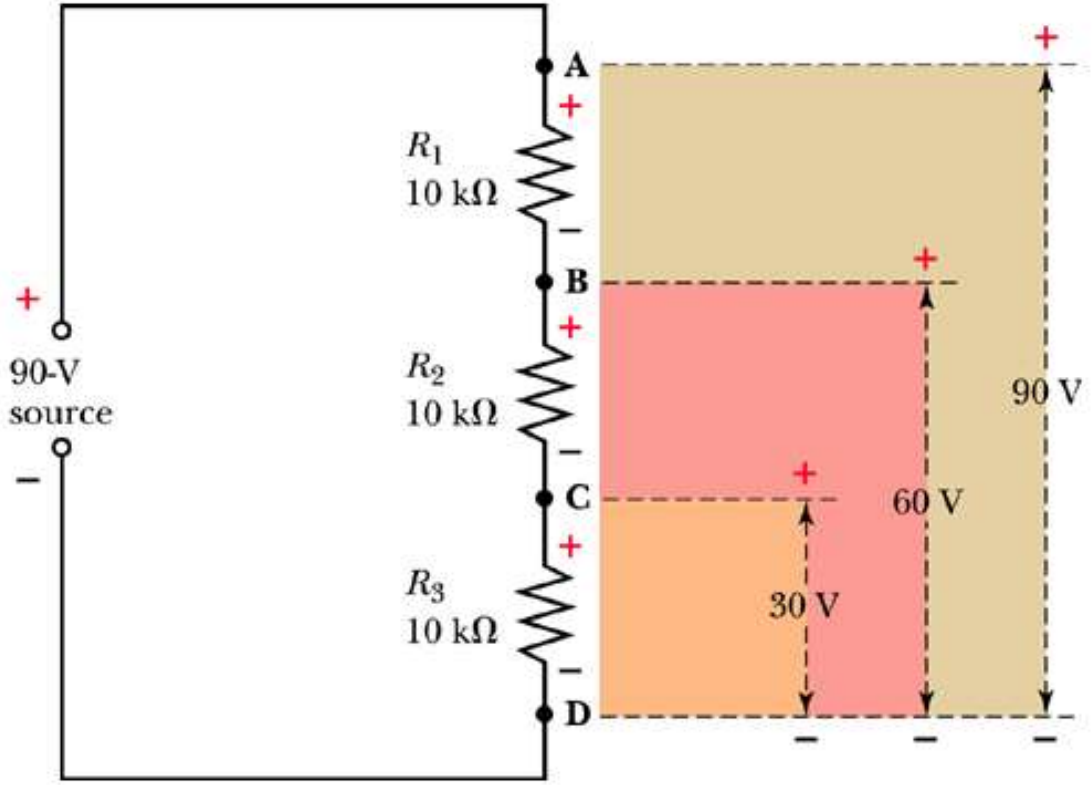
VOLTAGE DIVIDER



$$V_1 = \frac{R_1}{R_1 + R_2} V$$

$$V_2 = \frac{R_2}{R_1 + R_2} V$$

VOLTAGE DIVIDER



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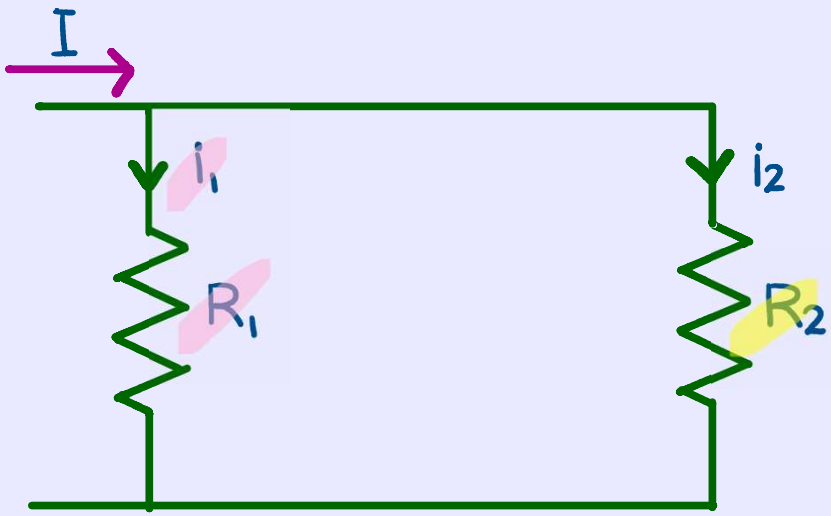
CURRENT DIVIDER

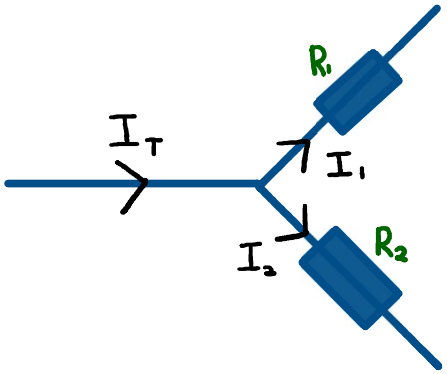


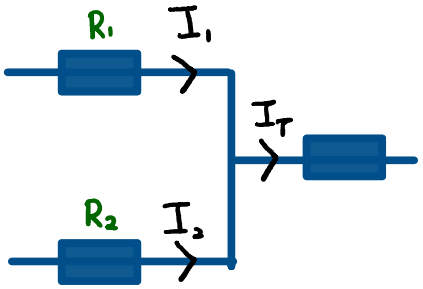
$$i_1 = \frac{R_2}{R_1 + R_2} I$$

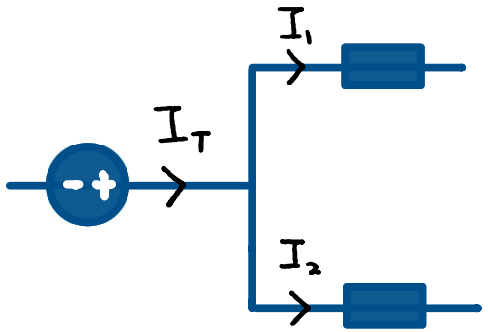
$$i_2 = \frac{R_1}{R_1 + R_2} I$$

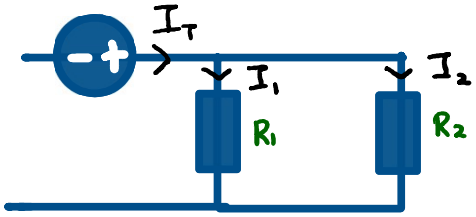
* ONLY TWO RESISTOR

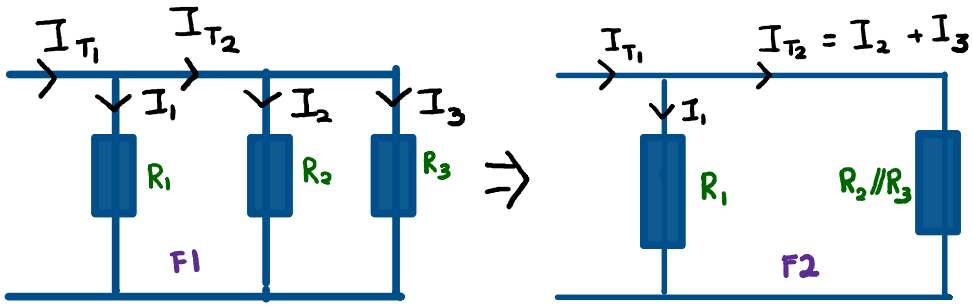
If the circuit consist more than 2, Simplified the circuit.











Find I_3

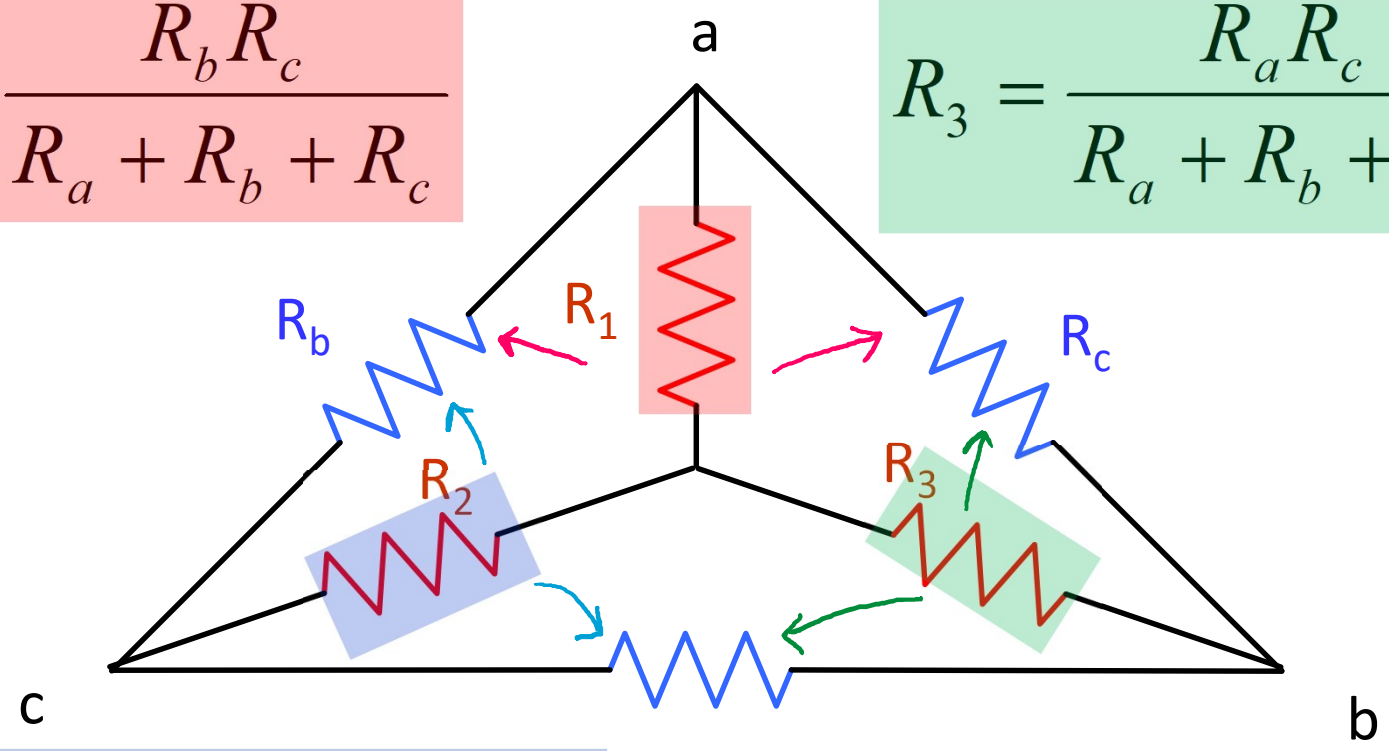
① Find I_{T_2} using CD-F2

② Find I_3 using CD-F1

DELTA(Δ)-WYE(Y) TRANSFORMATION

$$R_1 = \frac{R_b R_c}{R_a + R_b + R_c}$$

$$R_3 = \frac{R_a R_c}{R_a + R_b + R_c}$$

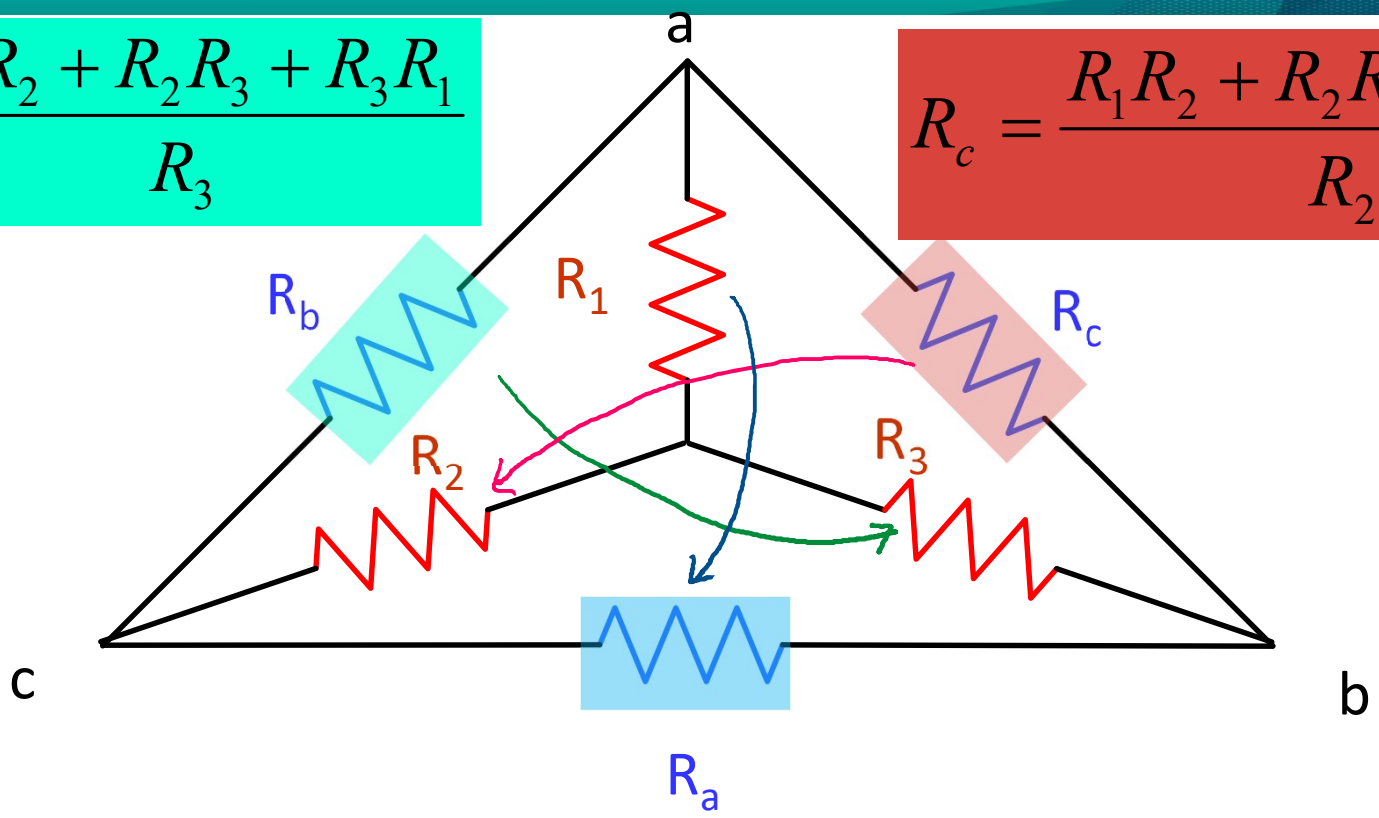


$$R_2 = \frac{R_a R_b}{R_a + R_b + R_c}$$

DELTA(Δ)-WYE(Y) TRANSFORMATION

$$R_b = \frac{R_1R_2 + R_2R_3 + R_3R_1}{R_3}$$

$$R_c = \frac{R_1R_2 + R_2R_3 + R_3R_1}{R_2}$$



$$R_a = \frac{R_1R_2 + R_2R_3 + R_3R_1}{R_1}$$

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