BOLD and Underline Word should be written with color pen. Use pencil margin, Page number with color pen, all drawing with pencil, table body with pencil but text will be ball pen, write both sides.

Experiment Name: Delta-Wye Conversion.

Objectives:

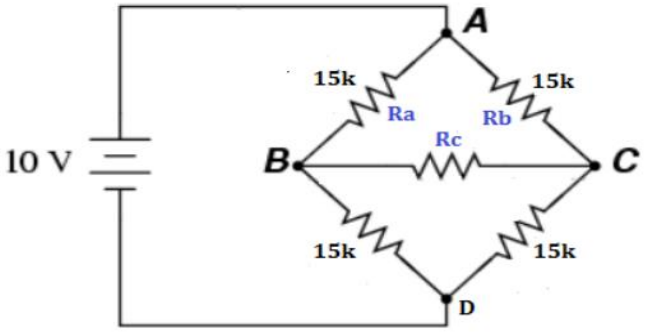
- To perform Delta-Wye Conversion
- To verify the results with measured data.
- Solve a complex circuit using Delta-Wye Conversion.

Apparatus:

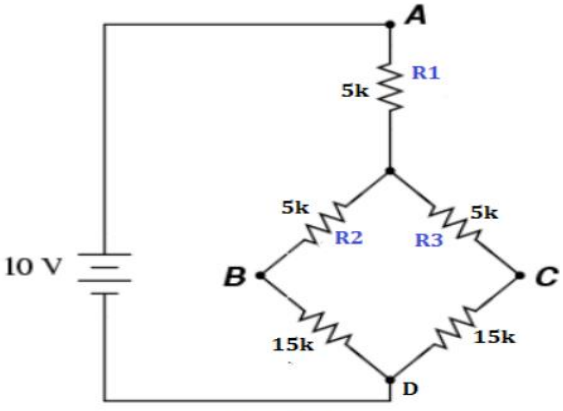
- Breadboard
- Resistors (5x 15 kΩ & 3x 5 kΩ)
- Digital Multimeter (DMM)
- DC Power Supply
- Wires

Circuit Diagram:

Update the resistors with measured Value and Source Voltage



Circuit 1



Circuit 2

Update the resistors with measured Value and Source Voltage

Data Table:

Table - 1:

V_s = ~~10.05 V~~
I_s = ~~0.68 mA~~

Readings	Circuit 1 (V)	Circuit 2 (Practical) (V)	Circuit 2 (Theoretical) (V)	% Error
V_{AB}	4.99	4.96	4.96	0%
V_{BC}	0.004	0.012	0.01	20%
V_{AC}	5.00	4.97	4.97	0%
V_{AD}	10.05	10.03	10.05	0.20%
V_{BD}	5.04	5.06	5.09	0.59%
V_{CD}	5.04	5.05	5.08	0.59%

V_S = 10.05 V

Open with

① Theoretical value

$$R_T = R_1 + \left((R_2 + R_3) \,||\, (R_3 + R_e) \right)$$

$$= R_1 + \left((4.85 + 14.89) \,||\, (4.89 + 14.88) \right)$$

$$= R_1 + \left(19.74 \,||\, 19.77 \right)$$

$$= R_1 + \left(\left(\frac{1}{19.74} + \frac{1}{19.77} \right)^{-1} \right)$$

$$= R_1 + 9.87$$

$$= 4.87 + 9.87$$

$$= 14.74\ k\Omega$$

~~$V_s = 10.05\ V$~~

$$\therefore I_s = \frac{V_s}{R_T} = \frac{10.05\ V}{14.74\ k\Omega} = 0.68\ mA$$

$I_{R1} = I_s = 0.68\ mA$

$V_{R1} = (0.68 \times 4.87) = 3.31\ V$

$I_{R2} = \dfrac{0.68 \times 9.87}{19.74} = 0.34\ mA$

$V_{R2} = (0.34 \times 4.85) = 1.65\ V$

$I_{R3} = \dfrac{0.68 \times 9.87}{19.77} = 0.34\ mA$

$V_{R3} = (0.34 \times 4.89) = 1.66\ V$

$I_{Rd} = I_{R2} = 0.34\ mA$

$V_{Rd} = (0.34 \times 14.89) = 5.06\ V$

$I_{Re} = I_{R3} = 0.34\ mA$

$V_{Re} = (0.34 \times 14.88) = 5.06\ V$

Now,

$V_A = 10.05\ V$

$V_B = (10.05 - 3.31 - 1.65) = 5.09\ V$

$V_C = (10.05 - 3.31 - 1.66) = 5.08\ V$

$V_D = 0\ V$

$\therefore V_{AB} = (10.05 - 5.09) = 4.96\ V$

$V_{BC} = (5.09 - 5.08) = 0.01\ V$

$V_{AC} = (10.05 - 5.08) = 4.97\ V$

$V_{AD} = (10.05 - 0) = 10.05\ V$

$V_{BD} = (5.09 - 0) = 5.09\ V$

$V_{CD} = (5.08 - 0) = 5.08\ V$

Error calculation.

For,

$V_{BC} = \left| \frac{0.01 - 0.012}{0.01} \right| \times 100\% = 20\%$

$V_{AD} = \left| \frac{10.05 - 10.03}{10.05} \right| \times 100\% = 0.20\%$

$V_{BD} = \left| \frac{5.09 - 5.06}{5.09} \right| \times 100\% = 0.59\%$

$V_{CD} = \left| \frac{5.08 - 5.05}{5.08} \right| \times 100\% = 0.59\%$

Graph:

N/A

Result Analysis:

After completing this experiment, we found that the voltage of each point of the two circuits is approximately the same. That means we successfully convert the delta circuit into a wye circuit.

Questions and Answers:

01. Already showed in Data Table Section.

Discussion:

After this experiment, we learn about converting a delta circuit to a wye circuit. Now we can analyze a complex circuit using Delta-Wye conversion. The theoretical value and the measured value are approximately the same. That means our two circuits support the Delta-Wye conversion. In this experiment, we don't face any problems. Everything works perfectly. We complete this experiment within a short time.

Attachment:

01. Signed Data Table.

02. Simulation using Multisim.