Basic Elec. Engr. Lab

ECS 204/210

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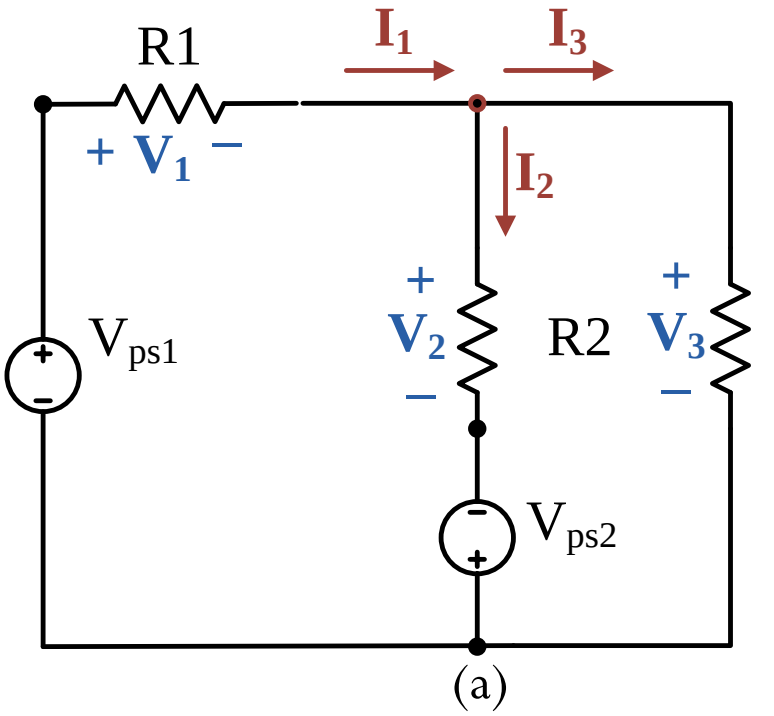
Office Hours:
BKD 3601-7
Tuesday 9:30-10:30
Friday 14:00-16:00

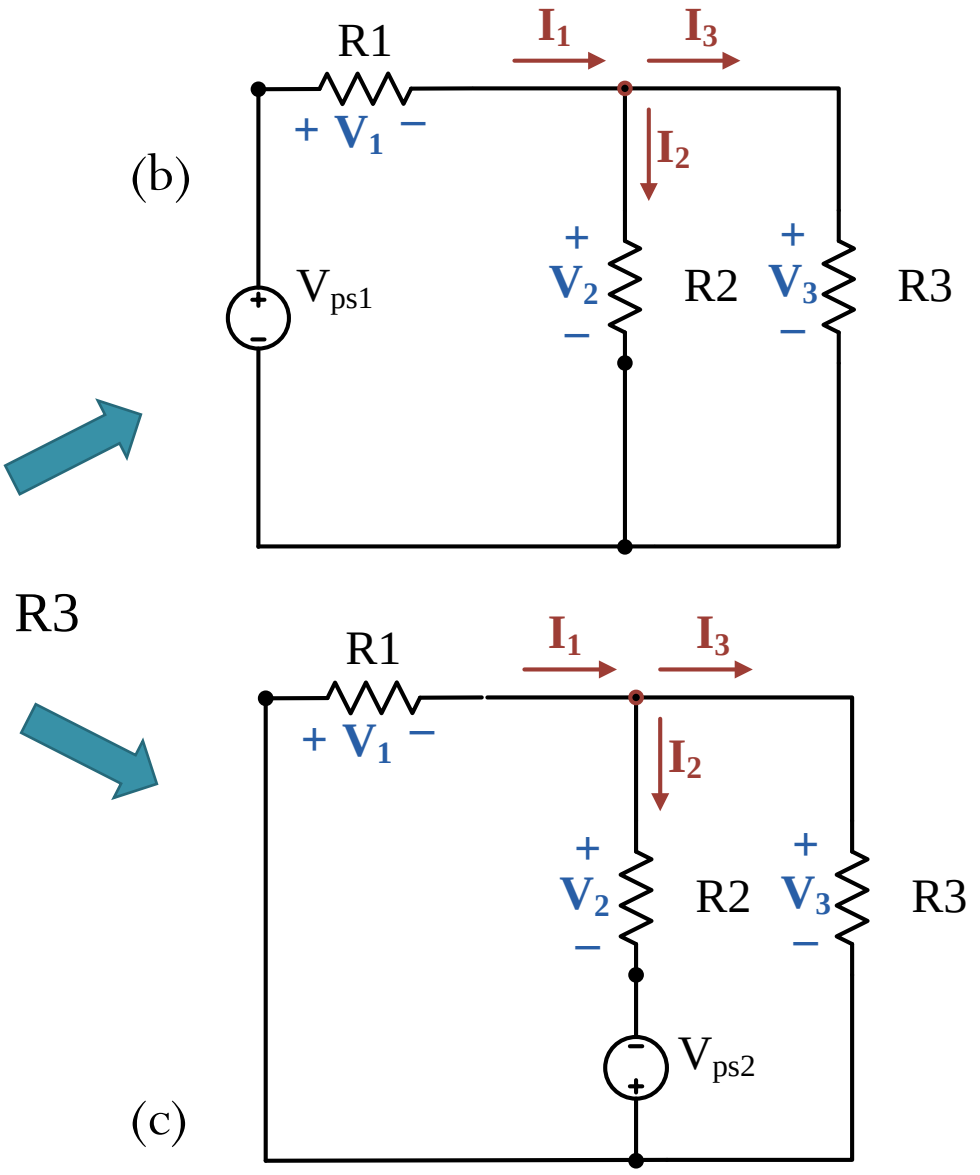
Lab 3

- Superposition Theorem
- Maximum Power Transfer

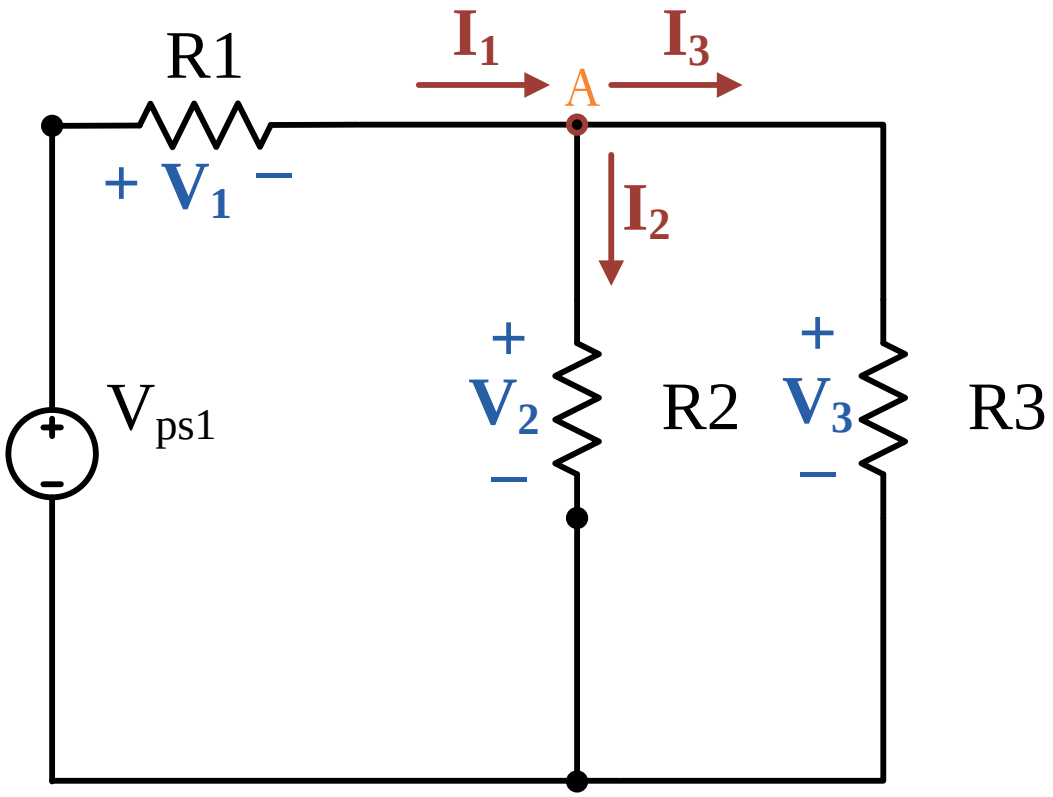
Part A


R1
I_1
I_3
+ V_1 −
I_2
+
V_2
−
R2
+
V_3
−
R3
V_{ps1}
V_{ps2}

(a)


(b)
R1
I_1
I_3
+ V_1 −
I_2
+
V_2
−
R2
+
V_3
−
R3
V_{ps1}
(c)
R1
I_1
I_3
+ V_1 −
I_2
+
V_2
−
R2
+
V_3
−
R3
V_{ps2}

A.b



$$V_A^{(b)} = \frac{R_2 // R_3}{R_1 + (R_2 // R_3)} V_{ps1}$$

$$V_1^{(b)} = V_{ps1} - V_A$$

$$V_2^{(b)} = V_A$$

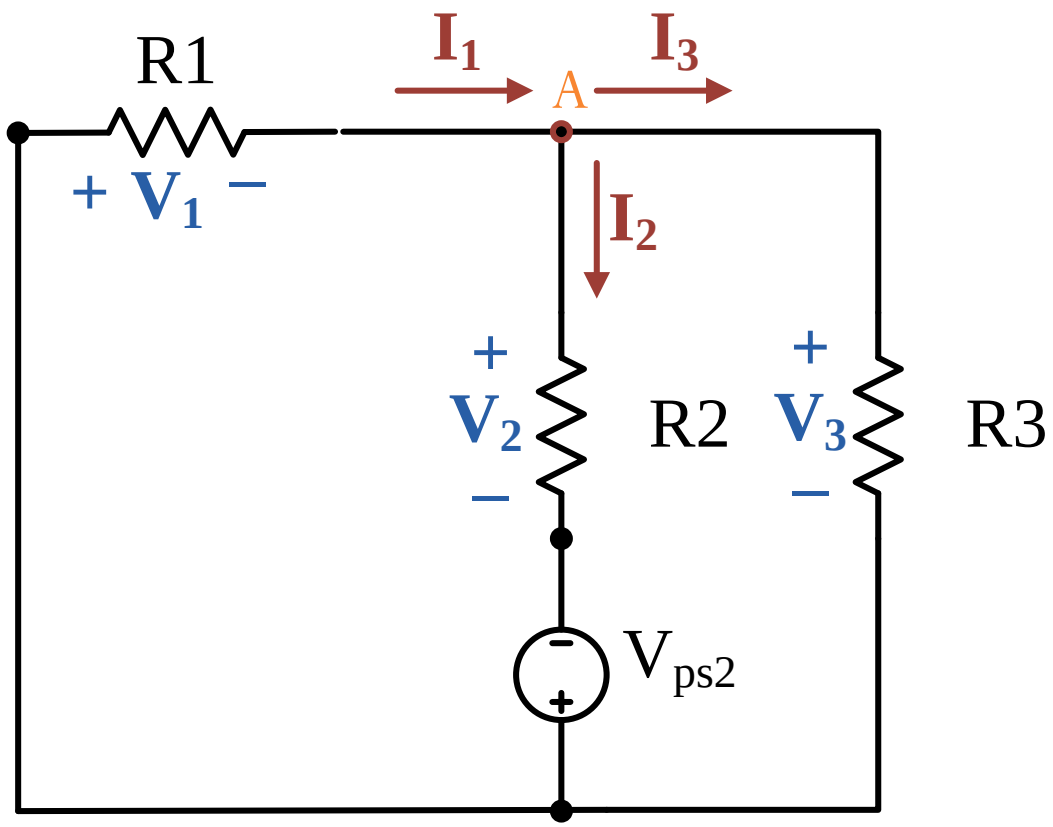
$$V_3^{(b)} = V_A$$

$$I_1^{(b)} = \frac{V_1}{R_1}$$

$$I_2^{(b)} = \frac{V_2}{R_2}$$

$$I_3^{(b)} = \frac{V_3}{R_3}$$

A.c



$$V_A^{(c)} = \frac{R_1 // R_3}{R_2 + (R_1 // R_3)} \times (-V_{ps2})$$

$$V_1^{(c)} = -V_A$$

$$V_2^{(c)} = V_A - (-V_{ps2})$$

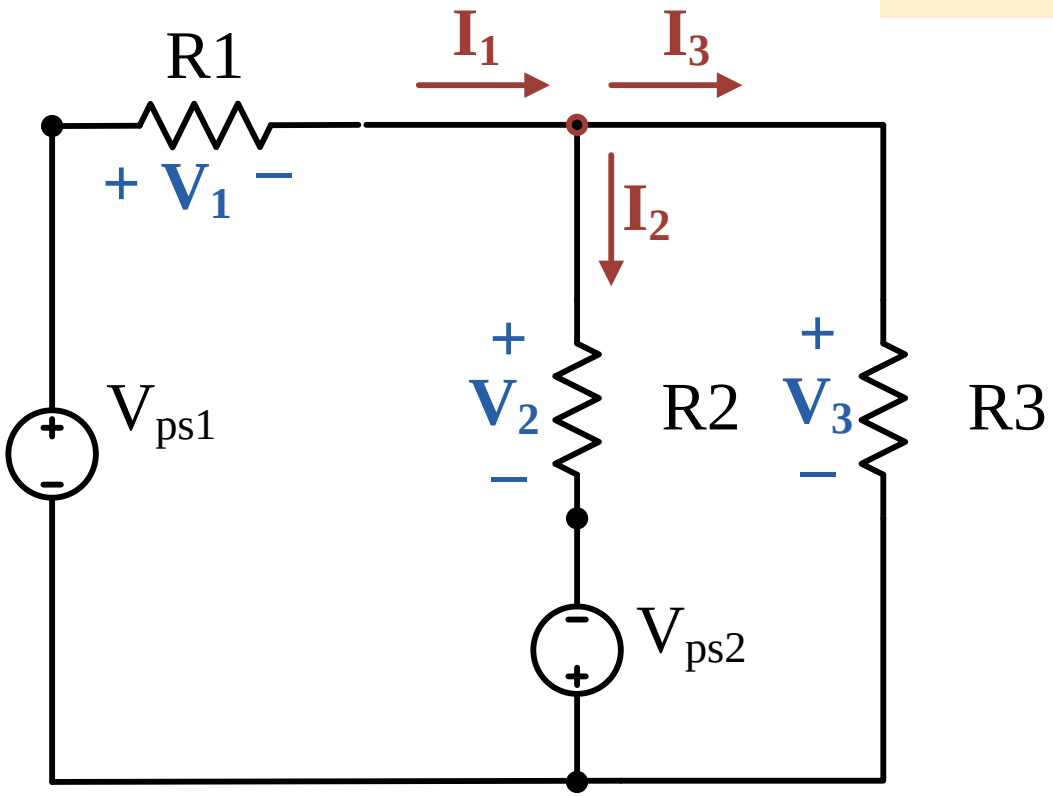
$$V_3^{(c)} = V_A$$

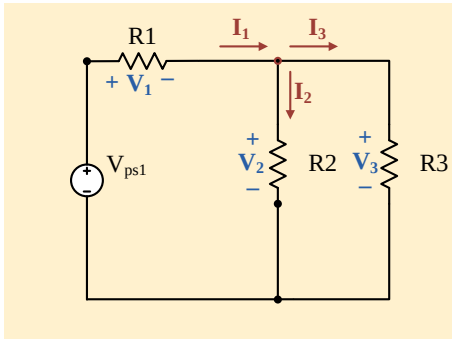
$$I_1^{(c)} = \frac{V_1}{R_1}$$

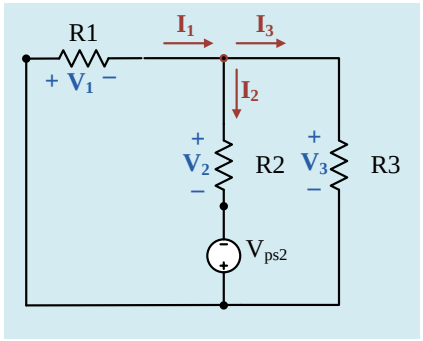
$$I_2^{(c)} = \frac{V_2}{R_2}$$

$$I_3^{(b)} = \frac{V_3}{R_3}$$

A.a



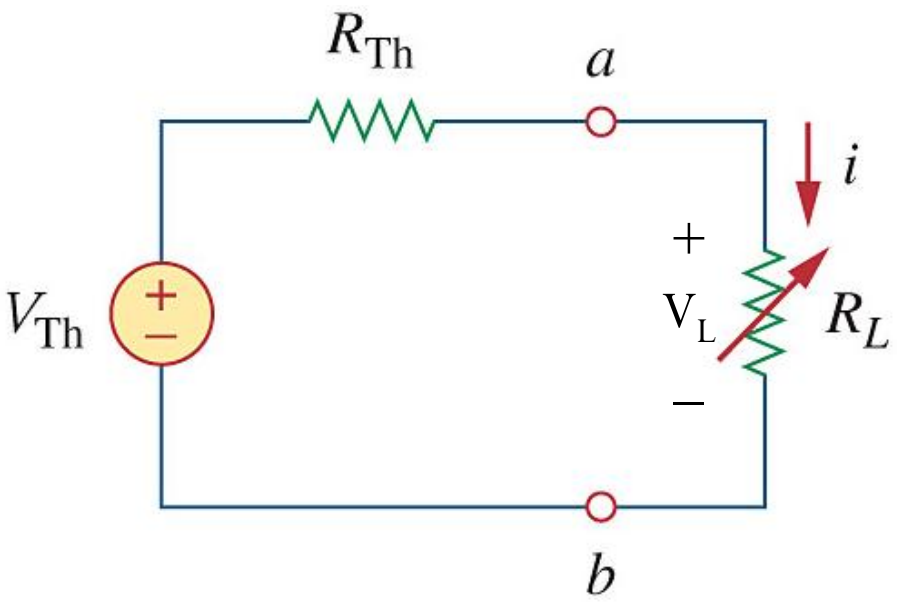




$$V_1^{(a)} = V_1^{(b)} + V_1^{(c)}$$
$$V_2^{(a)} = V_2^{(b)} + V_2^{(c)}$$
$$V_3^{(a)} = V_3^{(b)} + V_3^{(c)}$$
$$I_1^{(a)} = I_1^{(b)} + I_1^{(c)}$$
$$I_2^{(a)} = I_2^{(b)} + I_2^{(c)}$$
$$I_3^{(a)} = I_3^{(b)} + I_3^{(c)}$$

Remark: Some of these values will be negative!!

Part B



$$P_L = \frac{V_L^2}{R_L}$$

R_C = _____ Ω V_{PS1} = _____ V

	R_L(Ω)	V_L(V)	Calculated P_L(mW)
0			
300			
600			
900			
950			
1000			
1050			
1100			
1400			
1700			
2000			

$$P_{\max} = \frac{V_{TH}^2}{4R_{TH}}$$