TI DSP, MCU, Xilinx Zynq FPGA
기반의 프로그래밍 전문가 과정

<회로이론>

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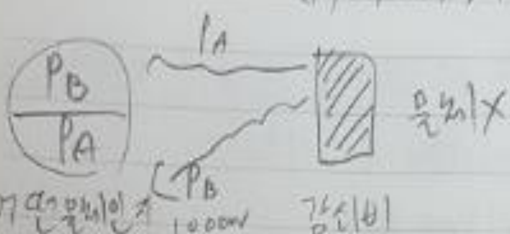
- 회로이론 개론
- 간단한 직,병렬 회로 분석
- 키르히호프의 법칙 (KVL, KCL)
- Δ-Y 변환법 분석
- 테브닌 회로 분석

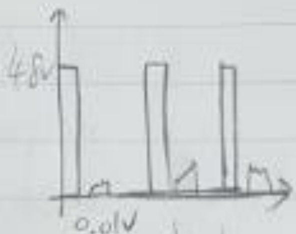
〈회로이론〉

- 수동소자 : RLC, Diode 외부전원 없이 구동 / 에너지를 소비 축적 하고 대로 통과
- 능동소자 : 전원의 에너지를 사용하여 에너지를 변환
  - ex) opamp, TR, FET



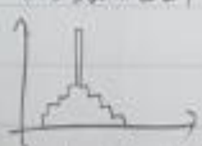
어떤 물체인지 알 수 있다 (레이더)

감쇠비
RF 제어
RCS(σ)?



AMP로 증폭

ADC로 샘플링해서 디지털신호로 만들고 필터처리 (잡음없는 신호)



떨어진 거리, 어떤 물체인지 알 수 없다.

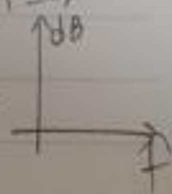
중력
전자기력 → maxwell 완성
ex) 핸드폰
강한 상호작용 (핵력)
약한 상호작용

맥스웰 방정식 ⇒ 결국 빛
빛의 파동성
↕
아인슈타인
빛의 입자성 (광전효과) → 노벨상

※ 발전은 AC로 송신은 DC로
DC가 손실이 적다
(고전압 송전시)
but 길거리 전송에는 AC가 좋다는게 기존의견

계산할 때 log 사용하는 이유
[dB] 너무 작거나, 너무 크다

· bodeplot 보드선도

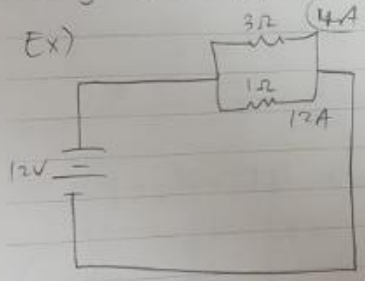


○ 청색LED : 소비전력이 매우 적다.
↘ 전자제품에 도입시 소비전력↓, 가격↓ (오래된 가전제품이 더 소비전력)

전기적 위치E : 전압
운동E : 전류

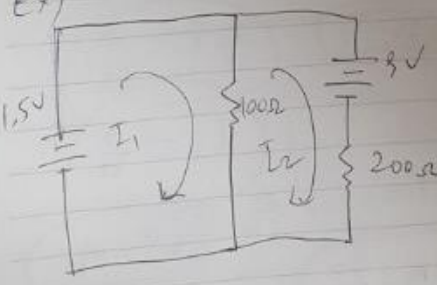
$\nabla \cdot \vec{J}$ E 보존법칙

Ex)



1A

Ex)



$-1.5V + 100(I_1 - I_2) = 0$

$100(I_2 - I_1) + 9V + 200I_2 = 0$

$-1.5V + 100I_1 - 100I_2 = 0$

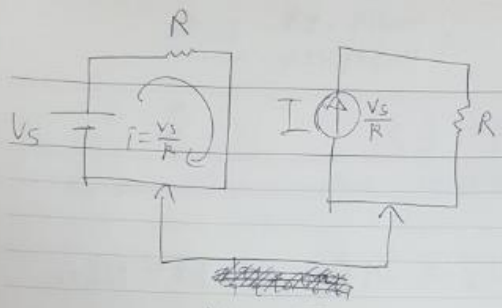
$300I_2 - 100I_1 + 9V = 0$

$200I_2 = -7.5V$

$I_2 = \frac{-7.5}{200} = \frac{-3.75}{100} = -0.0375$

$I_1 = 0.0225A = 22.5mA$

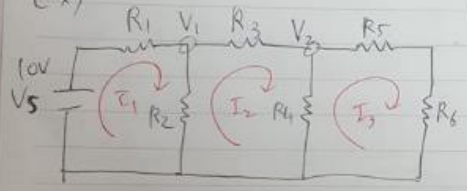
$I_2 = -0.0375A = -37.5mA$



V to I

Ex)

$R_1 = R_2 = R_3 = R_4 = R_5 = R_6 = 10\Omega$



$-10 + 10I_1 + 10(I_1 - I_2) = 0$

① $20I_1 - 10I_2 = 10 \Rightarrow 2I_1 - I_2 = 1 \Rightarrow 16I_3 - 3I_3 = 1$

$13I_3 = 1$

$I_3 = \frac{1}{13}$

$10(I_2 - I_1) + 10I_2 + 10(I_2 - I_3) = 0$

② $30I_2 - 10I_1 - 10I_3 = 0 \Rightarrow 8I_3 - 10I_1 - 10I_3 = 0$

$8I_3 = I_1$

$I_1 = \frac{8}{13}$

$10(I_3 - I_2) + 20I_3 = 0$

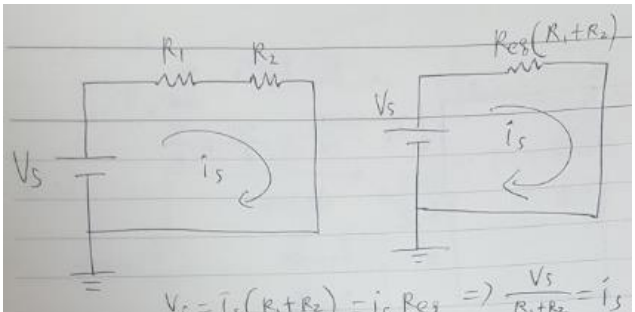
③ $30I_3 - 10I_2 = 0$

$3I_3 = I_2$

$I_2 = \frac{3}{13}$

$V_1 = 10 - I_1 10 = 10 - \frac{80}{13} = \frac{50}{13}V = V_1$

$V_2 = I_2 \times R_4 = \frac{30}{13}$

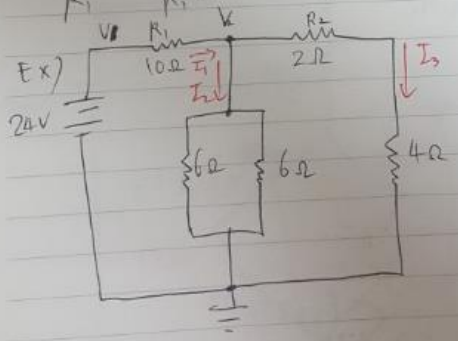


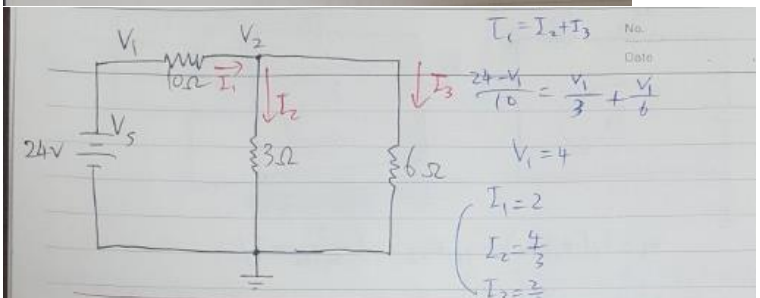
$V_s = i_s(R_1+R_2) = i_s R_{eq} \Rightarrow \frac{V_s}{R_1+R_2} = i_s$

$V_{R_2} = i_s R_2 = \frac{R_2}{R_1+R_2} V_s = \frac{R_2}{R_{eq}} V_s$

(병렬회로)

$\frac{V_s}{R_1} = \frac{R_{eq}}{R_1} i_s$ (전류분배)





$I_1 = I_2 + I_3$

$\frac{24-V_1}{10} = \frac{V_1}{3} + \frac{V_1}{6}$

$V_1 = 4$

$I_1 = 2$

$I_2 = \frac{4}{3}$

$I_3 = \frac{2}{3}$

① $I_1 = \frac{24-V_2}{10} \Rightarrow 10I_1 + V_2 = 24$

② $I_2 = \frac{V_2}{3} \Rightarrow 3I_2 - V_2 = 0$

③ $I_3 = \frac{V_2}{6} \Rightarrow 6I_3 - V_2 = 0$

$I_1 = I_2 + I_3$

② − ③ : $3I_2 = 6I_3$ $V_2 =$

$I_2 = 2I_3$

① + ② : $10I_1 + 3I_2 = 24$ $\Rightarrow$ $I_2 = 2I_3$, $13I_2 + 10I_3 = 24$

① + ③ : $10I_1 + 6I_3 = 24$

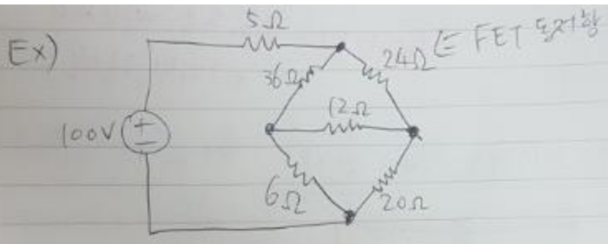
$26I_3 + 10I_3 = 24$

$36I_3 = 24$

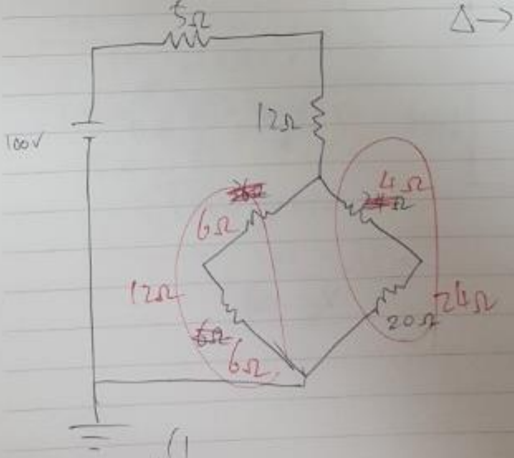
$I_3 = \frac{2}{3}$ $I_1 = 2$

$I_2 = \frac{4}{3}$

Ex)



⇓

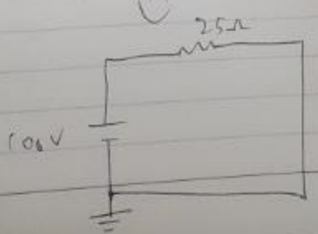


$\Delta \rightarrow Y \Rightarrow \frac{R_2 R_3}{R_1+R_2+R_3} = \frac{24 \times 12}{72} = 4$

$\Rightarrow \frac{R_1 R_3}{72} = 6$

$\Rightarrow \frac{R_1 R_2}{72} = 12$

⇓



〈테브넹〉

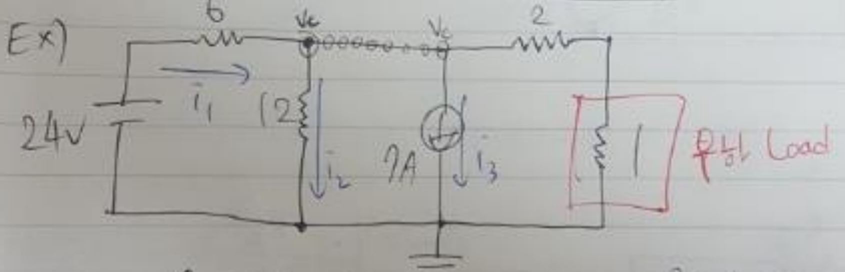
장비 — 회로

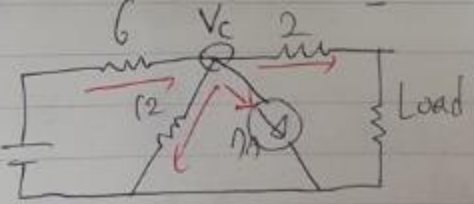
특성 동작의 변경

부하없다고 보고 전압, 전류 계산해서 ⇒ 저항 구함!

1. 테브넹 전압은 부하회로를 개방하여 얻는다.

Ex)





$i_1 = i_2 + i_3$

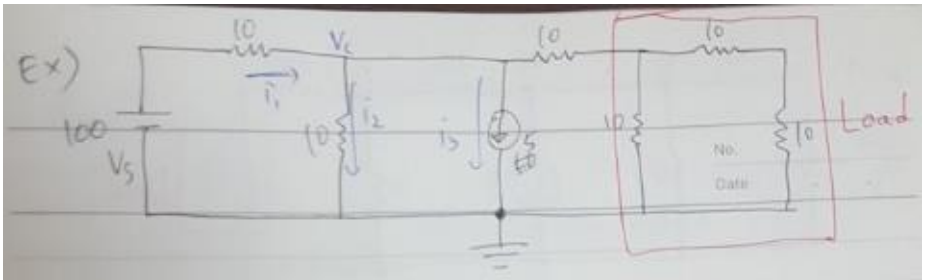
$\Rightarrow \frac{24 - V_c}{6} = \frac{V_c}{12} + 7$ ($V_c = V_{TH}$)

$48 - 2V_c = V_c + 84$

$-36 = 3V_c$

$V_c = -12V$

Ex)

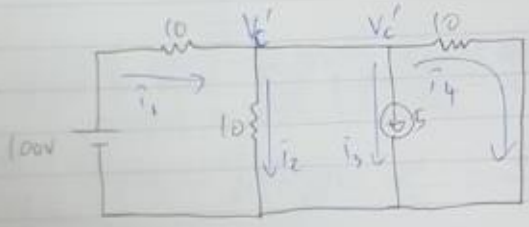


$\bar{i}_1 = \bar{i}_2 + \bar{i}_3$

$\Rightarrow \frac{100 - V_c}{10} = \frac{V_c}{10} + \frac{5}{1}$

$\Rightarrow 100 - V_c = V_c + 50$

$\boxed{V_c = 25}$



$\bar{i}_1 = \bar{i}_2 + \bar{i}_3 + \bar{i}_4$

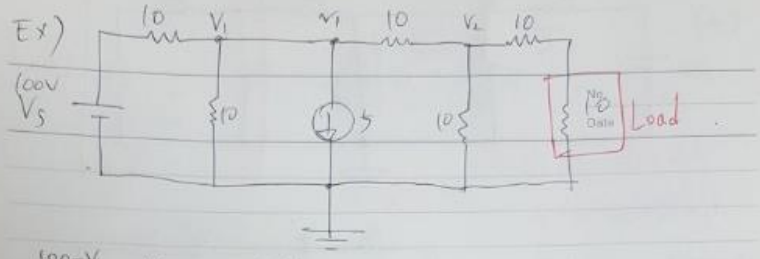
$\frac{100 - V_c'}{10} = \frac{V_c'}{10} + 5 + \frac{V_c'}{10}$

$100 - V_c' = V_c' + 50 + V_c'$

$50 = 3V_c'$

$\boxed{V_c' = \frac{50}{3}}$

Ex)



$\frac{100 - V_1}{10} = \frac{V_1}{10} + 5 + \frac{V_1 - V_2}{10} \Rightarrow 100 - V_1 = V_1 + 50 + V_1 - V_2$

$\frac{V_1 - V_2}{10} = \frac{V_2}{10} \Rightarrow V_1 = 2V_2$

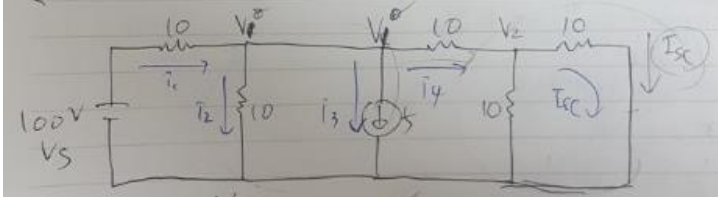
$50 = 3V_1 - V_2$

$= 5V_2$

$V_{TH} = V_2 = 10V$

$V_1 = 20V$

〈테브닌 등가회로〉



$\frac{100 - V_1}{10} = \frac{V_1}{10} + 5 + \frac{V_1 - V_2}{10} \Rightarrow 100 - V_1 = V_1 + 50 + V_1 - V_2$

$\frac{V_1 - V_2}{10} = \frac{V_2}{10} + \frac{V_2}{10} \Rightarrow V_1 = 3V_2$

$3V_1 - V_2 = 50$

$\boxed{V_2 = \frac{50}{8}}$

$V_{TH} = I_{sc} R_{TH} =$

$\Rightarrow R_{TH} = \frac{V_{TH}}{I_{sc}} = \frac{10}{5} \times 8 = 16\Omega$ $\left(10 \times \frac{8}{5}\right)$

$I_{sc} = \frac{50}{\frac{8}{10}} = \frac{5}{8}$