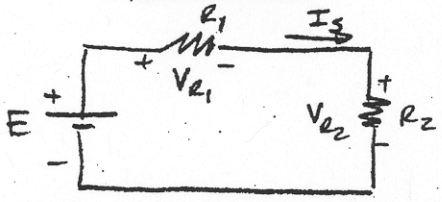
22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS
AMPAD

SERIES AND PARALLEL DUALITY

SERIES



① IN SERIES, CURRENT CONSTANT

② VOLTAGE: $E = V_{R_1} + V_{R_2}$

③ CURRENT: SAME CURRENT I_S THROUGH R_1, R_2

④ RESISTANCE: $R_T = R_1 + R_2$

⑤ KVL: $\Sigma_{LOOP} V = 0$

$\Sigma_{LOOP} V_{RISE} = \Sigma_{LOOP} V_{DROP}$

⑥ VOLTAGE DIVIDER:

$$V_x = \frac{R_x}{R_{EQ}} V_{EQ}$$

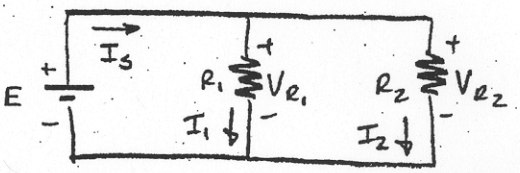
EX: $V_{R_1} = \frac{R_1}{R_1 + R_2} E$ (ABOVE)

⑦ POWER: $P = IV$

$P = I_S^2 (R_1 + R_2)$ (SERIES)

$= I_S^2 R_T$

PARALLEL



IN PARALLEL, VOLTAGE CONSTANT

CURRENT: $I_S = I_1 + I_2$

VOLTAGE: SAME VOLTAGE E ACROSS R_1, R_2

RESISTANCE: $R_T = \left(\frac{1}{R_1} + \frac{1}{R_2}\right)^{-1}$

KCL: $\Sigma_{NODE} I = 0$

$\Sigma_{NODE} I_{IN} = \Sigma_{NODE} I_{OUT}$

CURRENT DIVIDER:

$$I_{BR} = \frac{R_{EQ}}{R_{BR}} I_{IN}$$

EX: $I_1 = \frac{R_1 \| R_2}{R_1} I_S$ (ABOVE)

POWER: $P = IV$

$P = \frac{E^2}{(R_1 \| R_2)} = \frac{E^2}{R_T}$ (PARALLEL)

TRICKS

$R \| R = \frac{1}{2} R$

$R \| 2R = \frac{2}{3} R$

TWINKLE, TWINKLE LITTLE STAR

POWER = $I^2 R$