

Basic components and Electric Circuits (chapter 2)

RESISTORS IN SERIES AND PARALLEL

In series (same current)

$$i = \frac{v_s}{R_{eq}} = \frac{v_s}{R_1 + R_2 + \dots + R_N}$$

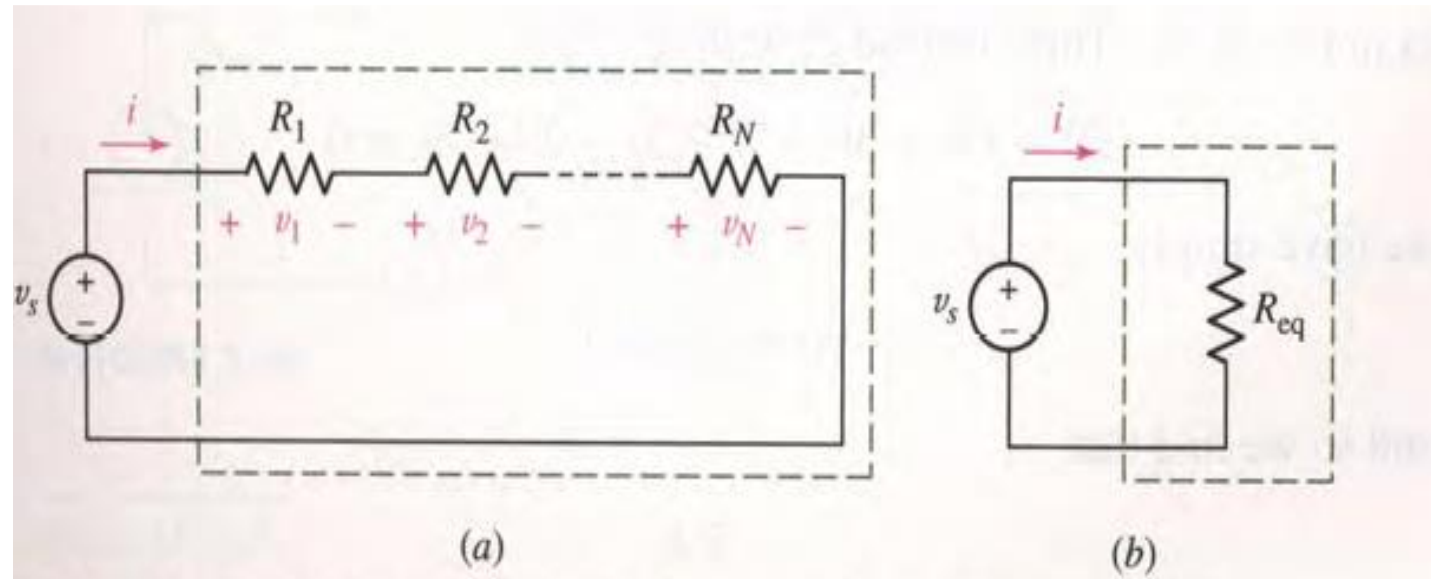
$$v_1 = i \cdot R_1$$

$$v_2 = i \cdot R_2$$

M

$$v_N = i \cdot R_N$$

$$v_s = v_1 + v_2 + \dots + v_N$$



$$R_{eq} = R_1 + R_2 + \dots + R_N$$

In Parallel : (same voltage)

$$v = i_s \cdot R_{eq}$$

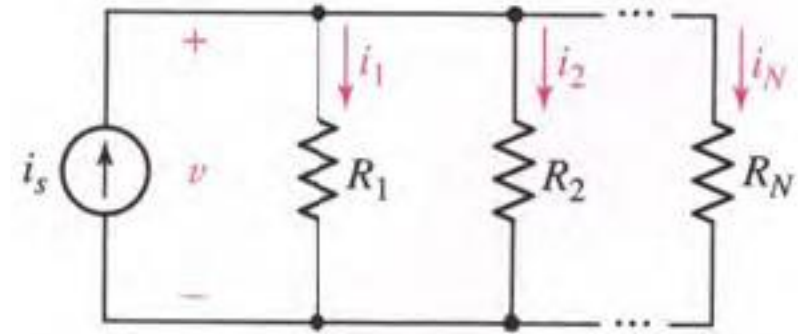
$$i_1 = \frac{v}{R_1}$$

$$i_2 = \frac{v}{R_2}$$

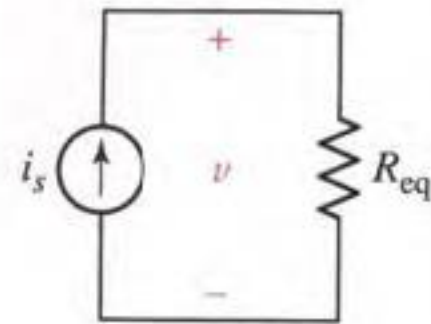
M

$$i_N = \frac{v}{R_N}$$

$$i_s = i_1 + i_2 + \dots + i_N$$



(a)



(b)

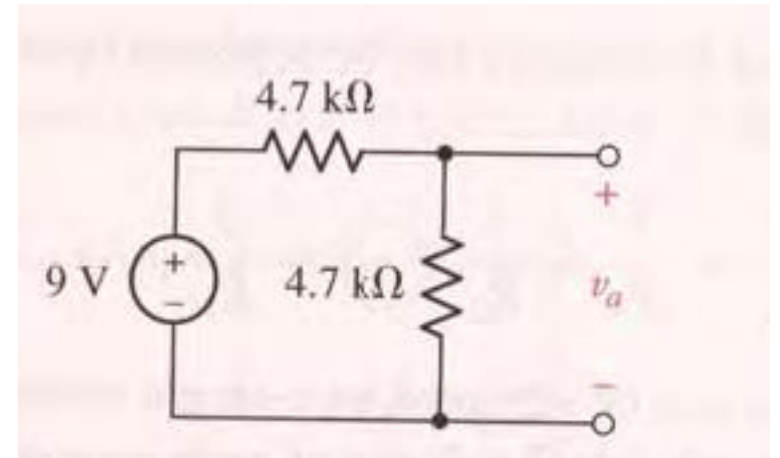
$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_N}$$

Question : Find value of V_a ?

$$R_{eq} = R_1 + R_2 = 4.7k + 4.7k = 9.4k$$

$$I = \frac{9}{9.4k} = 0.96mA$$

$$v_a = I.R_2 = 0.96m.4.7k = 4.5v$$



Question : Find values of v_1 , i_x , v_2 , i_y

$$R_{eq} = \frac{R_1 R_2}{R_1 + R_2} = \frac{10 \cdot 10}{10 + 10} = \frac{100}{20} = 5\Omega$$

$$R_T = 5 + 10 + 5 = 20\Omega$$

$$V_T = 5 \cdot (20) = 100v$$

$$i_x = \frac{100}{20} = 5A$$

$$v_1 = 5 \cdot (5) = 25v$$

$$v_2 = 5 \cdot (5) = 25v$$

$$i_y = \frac{v_2}{10} = \frac{25}{10} = 2.5A$$

