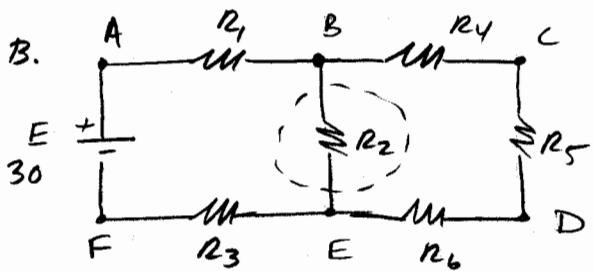
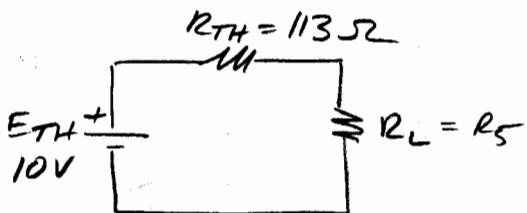


$$1. A. E_{TH} = V_{R_2} = \frac{R_2}{R_1 + R_2 + R_3} E = \frac{20}{60} (30V) = 10V$$

$$R_{TH} = R_4 + (R_2 \parallel (R_1 + R_3)) + R_6 = 40 + (20 \parallel 40) + 60 \\ = 113.35\Omega$$

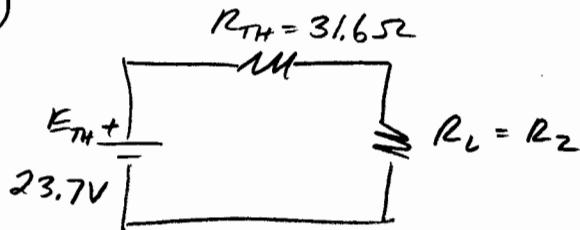


$$E_{TH} = V_{BE} = V_{R456}$$

$$= \frac{R_4 + R_5 + R_6}{R_1 + R_2 + R_3 + R_4 + R_5} E$$

$$= \frac{150}{190} (30V) = 23.68V$$

$$R_{TH} = (R_1 + R_3) \parallel (R_4 + R_5 + R_6) \\ = 40 \parallel 150 = 31.58\Omega$$



$$C. E_{TH} = E = 30V$$

$$R_{TH} = (R_2 \parallel (R_4 + R_5 + R_6)) + R_3 = (20 \parallel 150) + 30 = 47.65\Omega$$



$$2. A. E_{TH} = V_{R_2} = \frac{R_2}{R_2 + R_3} E = \frac{20}{50} (45V) = 18V$$

$$R_{TH} = R_2 \parallel R_3 = 20 \parallel 30 = 12.5\Omega$$



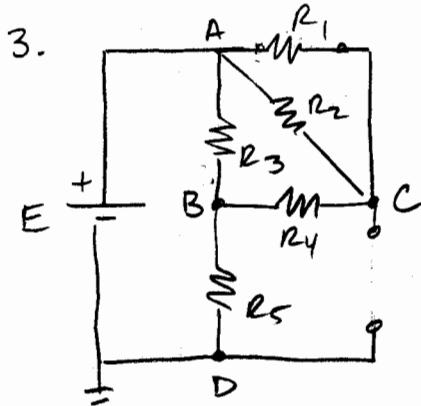
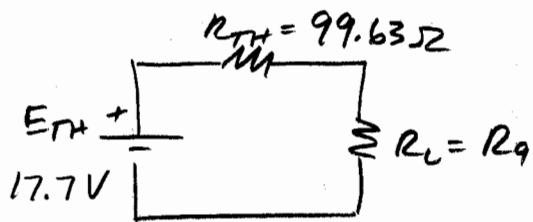
$$B. E_{TH} = E$$

$$R_{TH} = 0$$

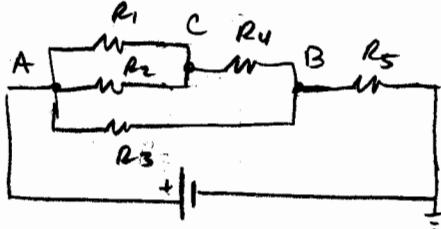


$$C. E_{TH} = V_{R_7} = \frac{R_6 \parallel R_7}{(R_6 \parallel R_7) + R_5} E = \frac{32.3}{82.3} (45V) = 17.66V$$

$$R_{TH} = R_8 + (R_6 \parallel R_6 \parallel R_7) = 80 + (19.63) = 99.63\Omega$$



$$E_{TH} = V_{CD} = V_C$$



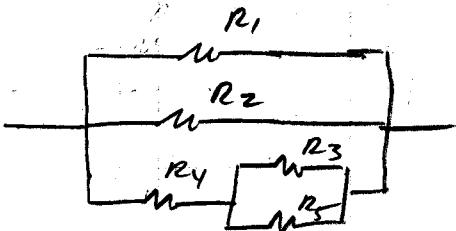
$$I_5 = I_s = \frac{E}{R_T} = \frac{60}{70 + [R_4 + (R_1 \parallel R_2)] \parallel R_3] = \frac{60}{70} = 857.1mA$$

$$I_4 = \frac{R_{124} \parallel R_3}{R_{124}} I_s = \frac{20}{40} 857.1mA = 428.6mA$$

$$V_C = V_{R_5} + V_{R_4} = 857.1mA(50) + 428.6mA(20) = 51.43V = E_{TH}$$

(3. cont.)

$$R_{TH} =$$



$$\begin{aligned}
 R_{TH} &= R_1 \parallel R_2 \parallel (R_4 + (R_3 \parallel R_5)) \\
 &= 30 \parallel 60 \parallel (20 + 40 \parallel 50) \\
 &= 20 \parallel (42, 22) \\
 &= 13.57 \Omega
 \end{aligned}$$