

Do loop rule on left loop (used CW path)

$$-I_1(25\Omega + 25\Omega + 20\Omega) + 6V + 6V - 9V - (I_1 - I_2) \cdot 5\Omega = 0$$

$$-I_1 \cdot 75\Omega + I_2 \cdot 5\Omega + 3V = 0$$

$$\therefore I_2 = 15I_1 - 0.6A \quad \textcircled{1}$$

Do loop rule on right loop (used CW path)

$$-I_2(10\Omega + 15\Omega + 30\Omega) - 6V + 9V + 3V + (I_1 - I_2) \cdot 5\Omega + 9V = 0$$

$$I_1 \cdot 5\Omega - I_2 \cdot 60\Omega + 15V = 0$$

substitute $\textcircled{1}$ into this eqn, get

$$I_1 \cdot 5\Omega - 60\Omega(15I_1 - 0.6A) + 15V = 0$$

$$-895\Omega \cdot I_1 + 51V = 0$$

$$\therefore I_1 = \frac{51V}{895\Omega} = 0.057A$$

substitute back into $\textcircled{1}$, get

$$I_2 = 15(0.057A) - 0.6A$$

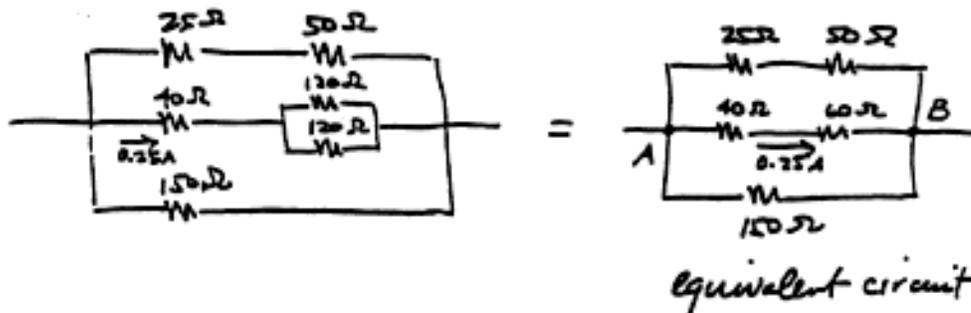
$$= 0.255A$$

$$\therefore \text{current from } B \rightarrow E = I_1 - I_2 = -0.198A \approx -200mA$$

14. Power dissipated in 25Ω resistor (see my current labels in #13) is $I_1^2 \cdot 25\Omega = (0.057A)^2 \cdot 25\Omega$

$$\therefore P = 0.081W$$

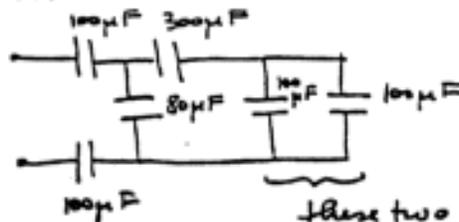
15. Redraw circuit



∴ Voltage between pts A & B is $(0.25A) \cdot (40 + 60\Omega) = 25V$
 Now the $(25 + 50\Omega)$ leg is in parallel w/ the $(40 + 60\Omega)$ leg
 so its voltage is also 25V, ∴ its current $I = \frac{25V}{25 + 50\Omega} = \frac{1}{3}A$
 ∴ Voltage across 50Ω resistor is

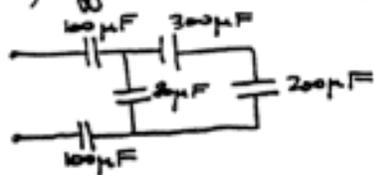
$$V = IR = \frac{1}{3}A \cdot 50\Omega \cong 16.7V$$

16. The two $200\mu F$ cap's are in series, so their effective capacitance $C_{eff} = \frac{200 \cdot 200}{200 + 200} = 100\mu F$. Network then becomes



these two are in parallel, $C_{eff} = 100 + 100 = 200\mu F$

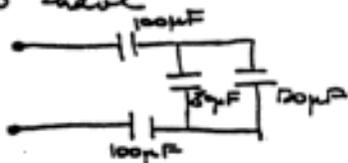
Hence, effective network is now



300 & 200 are in series

$$\therefore C_{eff} = \frac{300 \cdot 200}{300 + 200} = 120\mu F$$

Now have



80 & 120 are in parallel

$$\text{So } C_{eff} = 80 + 120 = 200\mu F$$

Finally



all 3 in series

$$\therefore \frac{1}{C_{eff}} = \frac{1}{100} + \frac{1}{200} + \frac{1}{100}$$

$$\Rightarrow C_{eff} = 40\mu F$$

