HW 6

25-47 $\overline{P} = 1800\ W$

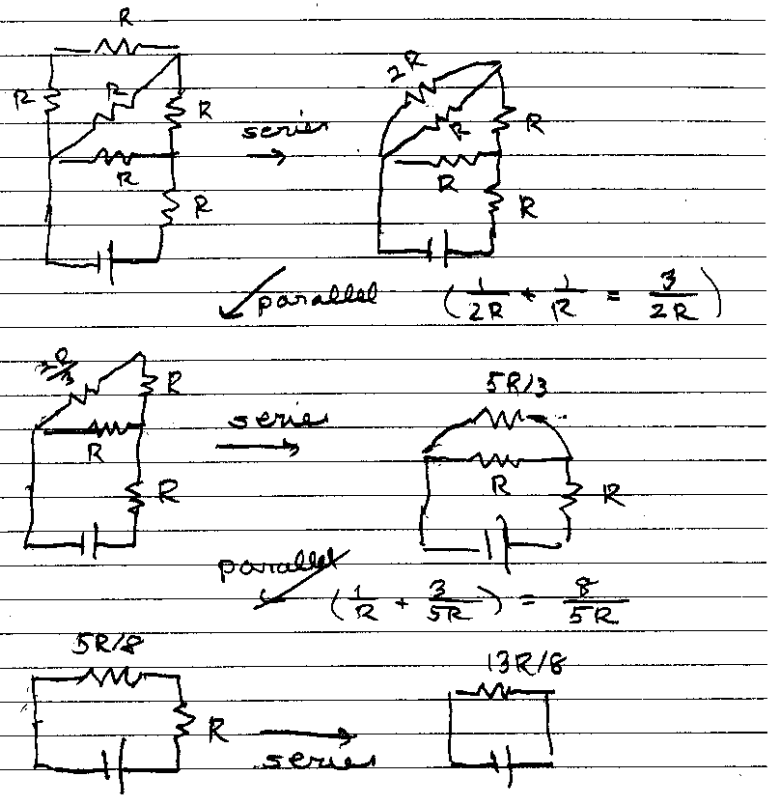
$V_{rms} = 450\ V$

$$I_{rms} = \frac{\overline{P}}{V_{rms}} = 4\ A$$

$$I_{peak} = I_0 = \sqrt{2}\, I_{rms} = 5.66\ A$$

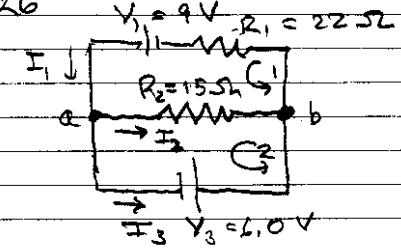
$$V_{peak} = V_0 = \sqrt{2}\, V_{rms} = 636\ V$$

26-11



$$R_{eq} = \frac{13}{8}R = \frac{13}{8}(2.8\ k\Omega) = 4.6\ k\Omega$$

26-26



Kirchhoff:

$I_1 = I_2 + I_3$ ✓a at both junctions

For the two loops shown add in voltage drop for internal resistances, $r_1 = r_3 = 1.2\Omega$

Get:

$V_1 - I_1 r_1 - I_2 R_2 - I_1 R_1 = 0$

$9.0V - I_2(15\Omega) - I_1(23.2\Omega) = 0$ ✓b

notice $+I_2R_2$ → opposite from (I_2 in opposite direction loop)

$V_3 - I_3 r_3 + I_2 R_2 = 0$

$6.0V - I_3(1.2\Omega) + I_2(15\Omega) = 0$ ✓c

Have to solve the three equations marked by "✓"

Have

$I_2 = -0.33A$ etc.

a ✓ in c ✓ →

$6.0 - (I_1 - I_2)(1.2) + I_2 15 = 0$

$-I_1(1.2) = -6.0 - I_2(16.2)$

$I_1 = \frac{6.0}{1.2} + I_2\left(\frac{16.2}{1.2}\right)$

$I_1 = 5.0 + I_2 13.5$

put in b ✓

$9.0 - I_2(15) - (5.0 + I_2 13.5)(23.2) = 0$

$I_2(-13.5 \times 23.2 - 15) + (9.0 - 5 \times 23.2) = 0$

$I_2(-328.2) - 107 = 0$

$I_2 = -0.33A$

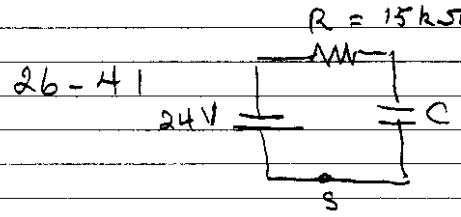
Then can get I_1 from b ✓:

$9.0V - (-0.33)(15)V - I_1(23.2\Omega) = 0$

$I_1 = 0.60A$

Then $I_3 = I_1 - I_2 = 0.93A$

26-41



a) $\tau = RC = 55\,\mu s$

$= 5.5 \times 10^{-5}\ s$

$C = \dfrac{5.5 \times 10^{-5}\ s}{1.5 \times 10^{4}\ \Omega}$

$= 3.67 \times 10^{-9}\ F$

$= 3.67\ nF$

b) Time for voltage across R to reach 16.0 V

Use

$16.0\ V = V = IR$

$= \dfrac{\mathcal{E}}{R} e^{-t/RC} \times R$

$16.0\ V = 24\ V\ e^{-t/\tau}$

$\frac{2}{3} = e^{-t/\tau}$

$\ln \frac{2}{3} = -t/\tau \rightarrow t = 5.5 \times 10^{-5}\ s \cdot \ln \frac{3}{2}$

$-\ln \frac{3}{2}$ $\qquad$ $5.5 \times 10^{-5}\ s$ $\qquad$ $t = 2.2 \times 10^{-5}\ s$