Midterm 2 Phys 180 3:00-4:30 pm

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2 Ch 9

1. a) $\frac{15-4\,\Omega}{1000\,\Omega} = 15-7\,F$

b) It would be difficult in practice because that would require a RC time shorter than the already tiny $15-4$ s at a time.

c) $\frac{\Delta V}{t} = \frac{\Delta V}{t}$ $\quad \frac{60\,mV}{15-4\,s} = \frac{30\,mV}{x}$ $\quad \frac{0.003\,mV/s}{60} = \frac{60\,mV/x}{60}$

let x be the time to reach 30 mV

$x = 50-5$

2. a) $0 = 120\sin(120\pi t)$

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$2\pi = 120\pi t$ $\quad t = \frac{1}{60}\,s$ $\quad 0 = 120\pi t$ $\quad t = 0\,s$ $\quad \pi = 120\pi t$ $\quad t = \frac{1}{120}\,s$

b) $\left(\frac{120\,V}{1000\,\Omega}\right)(120\,V) = 14.4$ watts

c) $\int_0^{\frac{1}{60}} (1000\,\Omega)(120)\sin(120\pi t)\,dt$

$120000\int_0^{\frac{1}{60}} \sin(120\pi t)\,dt$

$1440000\cos(120\pi t)\Big|_0^{\frac{1}{60}}$

$= 1.44 \times 10^7$ watts

3. $(365\,\text{days}/12)(24\,hr) = 730\,hr$

$\frac{730\,hr}{12\,hr} = 60.83\,hr$

$(3.00\,A)(110\,V) + 100 + 60 + 3 = 483\,W$

$(0.483\,kW)(60.83\,hr) = 29.38\,kWhr$

$29.38\left(\frac{0.2\,\text{dollars}}{kWhr}\right) = 5.88$ dollars

3 Ch. 10

1. $\frac{12V}{2000\Omega} = i_2 = i_3 = 0.006A$ $\quad i_2 + i_3 = 0.012A = i_1$

$(0.012 + 0.006)(24V) = 0.432 \text{ watts}$

2. a) $\left(\frac{1}{0.25} + \frac{1}{0.75}\right)^{-1} = 0.125$ $\quad \frac{3.0V}{50.125\Omega} = 0.059A$

$0.125 + 50 = 50.125\Omega$

b) $\frac{2.5Ahr}{0.059A} = 41.7hr$

4 Ch. 11

1. a) negative

b) The radius of the path indicates that there was a fluctuation in the current.

c) $(-1.6 \times 10^{-19}C)(10^6 m/s)(0.05T) = -8 \times 10^{-15}N$

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