EET/CPE 1140 - Homework # 4

Chapter 4

11. A particular electronic device uses 100 mW of power. If it runs for 24 h, how many joules of energy does it consume?

$$power(watts) = \frac{work(joules)}{time\ (seconds)}$$

$$P = \frac{w}{t}$$

$$P * t = w$$

$$work(J) = 24h * \frac{3600}{1h} * 100 * 10^{-3}$$

8.64kJ=360*24

25. A 12 V source is connected across a $10\ \Omega$ resistor.

a. How much energy is used in two minutes?

b. If the resistor is disconnected after one minute, is the power during the first minute greater than, less than, or equal to the power during a two minute interval?

a)

$$P=IV$$

$$V=IR$$

$$\frac{V}{R}=I$$

$$W = Pt$$

$$P=\frac{V^2}{R}$$

$$P=\frac{12^2}{10}$$

$$P=\frac{144}{10}$$

$$P = 14.4\ W$$

$$W=\frac{144}{10}watts*2mins*\frac{60secs}{1min}*\frac{1hour}{3600secs}$$

$$W=\frac{288}{600}\text{watt hours}$$

$$W=0.48*10^{-3}10^{3}\ watt\ hours$$

$$W=480*10^{-3}kWh$$

b)

The problem implies that the resistor is connected for 1 minute.

$$W = \frac{144}{10} watts * 1mins * \frac{60secs}{1min} * \frac{1hour}{3600secs}$$

$$W = \frac{1400}{600} \text{watt hours}$$

$$W = 0.24 * 10^{-3}10^{3}\ watt\ hours$$

$$W = 240*10^{-3}kWh$$

$W = 240*10^{-3}kWh$ in the one-minute case

$240*10^{-3} < 480*10^{-3}$

Therefore, lesser energy

35. How much average current can be drawn from an 80 Ah battery for 20 h?

$$I = \frac{80\ amp\ hours}{20\ hours} = 4A$$

*39. A certain power supply provides a continuous 2 W to a load. It is operating at 60% efficiency. In a 24-h period, how many kilowatt-hours does the power supply use?

$$work(joules\ or\ kilowatt\ hour)$$
$$= energy(watts\ or\ \frac{joules}{second}) * time(second)$$
$$work = 2 * 24 * \frac{60}{100}$$
$$work = 28.8\text{kWh}$$

But 60% might be extraneous information because 60% is the AC to DC conversion cost it is still consuming 2 watts per hour from the power grid

Work = 2*24

$$work = 48\ kWh$$

From the power grid