Waves, DC Circuits   PHYS 501   Homework 1

NAME:_____   (12 points possible)

1. For each frequency, calculate the wavelength in meters. If it is a **valid** amateur frequency, put which band it's in (17m, etc), *NOTE SIGNIFICANT DIGITS*
http://www.arrl.org/files/file/Regulatory/Band%20Chart/Band%20Chart%20-%2011X17%20Color.pdf

Frequency (MHz)	wavelength(m)	"band" (if relevant)
a. 49.00	_____	
b. 52.525	_____	
c. 28.50	_____	
d. 221.15	_____	
e. 146.52	_____	
f. 444.825	_____	
g. 450.7125	_____	
h. 14.300	_____	

2. An automobile battery generally supplies 12V. Is that AC or DC? _____.

If your transceiver transmits 100W, how much current would that require from your car battery? (but of course your transmitter is not 100% efficient, so the fuse had better be larger than that…) (power (W) = I x V) *(always show your work)*

_____A

3.   If a gamma ray has a wavelength of 1 nm, what would its frequency be (Hz) (use scientific notation). $c = 3 \times 10^8$ m/s

_____Hz

4. If a circuit has a total resistance of 2 MΩ and a current of .5 A, what is the voltage?

_____ V   and the power would be _____W

5. If you take the circuit of (4) and put two 2 MΩ resistors in series, what would the new current be?

_____ A   and the total power would be _____ W

6. If you take the circuit of (4) and put two 2 MΩ resistors in parallel, what would the new current be?

_____ A   and the total power would be _____ W

What would be the net effective resistance?   _____ MΩ

7. You are going on a camping trip into the woods. Which kind of battery would you want in your handy-talkie? _____ Why?_____

_____

    a. Nickel-cadmium   b. iron-pyrite

    c. lead-acid   d. lithium-ion

8. What is the effective resistance of a circuit with 280V and current of 60A? (hybrid car)

_____ Ω; what is the power? _____

9.   What is the voltage across a 50Ω resistor if a current of 2 A flows through it?

_____ V; what is the power? _____

10. Most homes use an average of 2-3 KW of power. Over the course of a day, how many kilowatt-hours would be used if the average is 3 KW? _____

How many KWH would be used in a 30 day month? _____

(a Kilowatt-hour is a unit of energy, a rate of 1 Kilowatt (1000 J/s) used steadily for one hour. So 1 KWH = 3.6E6 Joules).

11. Check your electricity bill if you pay it yourself (if you live in a dorm, ask your folks for a bill). Choose a summer month if you have one. Month/year chosen: _____

How many KWH did you use that month? _____

What was your average rate of usage (KW)? (divide by the number of hours in a month) _____

What was the price you paid per KWH?_____

12. A solar cell that's 1 m square can deliver about 40W. Assuming its daily summer output is equivalent to 6 hours of max power, how many square meters do you need for your house? *(hint – how many KWH per day does each cell provide?)*

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