PHYSICS-2

Elementary Physics of Energy

Quiz 3

Date: May 23, 2012 in class, Time 30 minutes. [100] points total.
None of the problems requires any elaborate calculation.

Your name IN CAPITALS:

1. Resistors A and B are connected in parallel, and R_A is larger than R_B.

   (a) Write down the effective resistance of the pair: [15]

   The effective resistance is given by $R_{eff} = R_A R_B/(R_A + R_B)$.

   (b) Which resistance dissipates greater power?[10]

   The smaller resistance i.e. R_B *for reasons discussed in class*

2. The allowed units of the solar constant that are dimensionally correct are (tick each answer as right or wrong)

   (i) Btu per square foot. [5] *No*

   (ii) Watts per square meter.[5] *Yes*

   (iii) Calories per square cm.[5] *No*

   (iv) Horsepower per square foot.[5] *Yes*

   (v) Newtons per square foot. [5] *No*

3. Blue light has a shorter wave length than red light, microwaves have a longer wavelength than red and x-rays have a shorter wave length than blue light. Write down the correct sequential order of the energy per photon of these four types of radiation. [25]

   Answer: $E_{x-ray} > E_{blue} > E_{red} > E_{microwave}$

4. Answer in yes or no.

   (i) Metals have filled bands. [5] *No: metals have partially filled bands*

   (ii) The Pauli principle sets a limit on the electronic occupation of each energy level.[5] *Yes*

   Choose the correct alternative

(iii) The greenhouse effect arises because CO_2 has a (minimum/or maximum) in its absorption coefficient at the 5 micron wavelength.[5] *maximum.*

(iv) The wavelength of radiation from the earth is (shorter/longer) than that from the sun.[5] *longer*

(v) The force between two charges varies as the (inverse distance/ inverse square distance) between them.[5] *inverse square.*