PHYSICS-2

Elementary Physics of Energy

Quiz 1

Date: APRIL 16, 2011 in class, Time 30 minutes. [100] points total.
Use the question sheet for your answers.

Your name in Capitals:

Model Solution

1. Sort the following list of energy sources into renewable and non renewable categories. (a) Hydroelectric (b) Coal (c) Shale oil (d) Solar energy (e) Wind (f) Wood [20]

   Renewable: (a) Hydroelectric (d) Solar energy (e) Wind Non renewable (b) Coal (c) Shale oil (d) Wood

2. Write the dimensions of the following objects (all dimensions can be reduced to those of mass, length and time. For example velocity has dimensions L/T)

   (a) Gravitational acceleration "g" (b) Power (c) Calorie/Joule (d) Force (e) Energy. [20]

$$\begin{aligned} [g] &= L/T^2 \\ [Energy] &= ML^2/T^2 \\ [Power] &= ML^2/T^3 \\ [Force] &= ML/T^2 \\ [Calorie/Joule] &= \text{dimensionless number} \end{aligned}$$

3. How many Joules are contained in a watt hour?

   [20]

   Since 1 watt x 1 second is a Joule, the required answer is 60x60 = 3600 Joules (An hour has 3600 seconds)

4. Define (in brief) the term “Insolation”.

   [10]

   Insolation is the energy per 8 hour day obtained from the sunlight at a given location.

5. Define (in brief) a “calorie”. [10]

   A calorie is the heat required to warm up 1 gm of water by 1 deg celsius.

6. Consider the statements

   “Natural gas is inorganic matter compressed by gravity”. False [5]

   “Shale oil has a higher energy density than coal.” False [5]

   “ Rocks do not allow liquids to flow through them”. False [5]

   “USA produces more electricity per year than any other country in the world”. True [5]