Physics 2

Elementary Physics of Energy

Practice Second Midterm

2 June 2012
Solution to be posted on 6th June 2012

1. Two resistors with resistances 2 Ohms and 3 Ohms are connected to a 10 V battery,
   (a) in series
   (b) in parallel.
   For each case find the voltage drop across each, the total current in the circuit and the amount of Joule heating produced in each resistor. [25]

2. A power plant generates 1000 MW which is transmitted by a power line that carries a current of 500 Amps. If the end voltage is 800,000 V what is the resistance of the line?[25]

3. A car wash needs 500 gallons of water a day heated from 50^0F to 100^0F. How large a solar collector would be needed to do this? The incident insolation is 1000 Btu/ft^2 and the collector efficiency is 30%.[20]

4. a) A hydel project has a head of 90 meters, and the river is known to deliver 1 Billion litres per hour of water. Assuming 80% efficiency, find the energy we can extract from the project per day. [15]

   b) How much power can be generated from a lake 1km long by 9 km wide and depth 250 meters by draining it through a water fall of height 500 meters over 1 year (1 yr = 3.15×10^7 sec)?[15]