ECE 3600 homework # 1 **Due: Tue, 9/2/08** a

HW # 1: 1.1, 2 due: Tuesday 9/2 by 5:00 pm in the ECE 3960 (3600) locker

Name: _____

ECE 3600 homework # 2 **Due: Thur, 9/4/08**

Chapter 1.

1. The name of the organization which ensures the reliability of power in North America.

2. Electric Utilities have been forced to break up into two separate companies responsible for:
   a. locally: PacificCorp and others
   b. locally: Rocky Mountain Power

3. What deregulation provided for independent power producers (IPPs).

4. The current bottleneck to overall system capacity.

Chapter 3.

1. Be able to rank the sources of electrical energy in the US (highest to lowest %)
   1.
   2.
   3.
   4.
   5.

2. List 3 of the "Other" sources.
   1.
   2.
   3.

3. Rank the sources of electrical energy in the US by environmental and social negatives (worst to best). Assume "Other" is all the 3 you listed above. Consider petroleum just a little worse than natural gas (due to the danger of spills). Also give (in your opinion) the worst environment or social negative of each. Your answers here may be subjective.
   1.
   2.
   3.
   4.

4. Rank the sources of electrical energy in the US cost per kWh (cheapest to most expensive). List Nat gas twice, once for single cycle and once for combined-cycle. Choose one of the "Other" that you listed above. Initial costs are amortized over the life of the generation facility. You will have to make some guesses and may qualify your answers.
   1.
   2.
   3.
   4.
   5.
   6.

5. Give the approximate efficiencies of each type of power plant:
   a. Hydroelectric
   b. Rankin-cycle steam turbine plants, regardless of the source of heat. (coal, oil, gas-steam, nuclear, solar-steam, geothermal)
   c. Single-cycle gas turbine
   d. Combined-cycle gas turbine

6. In nuclear fission reactions, what is particle is crucial to the chain reaction and is used to control the reaction rate?

7. a) What are the two most common isotopes of uranium?

   b) Which of the two is split in a fission reactor?

   c) This isotope is what percentage of natural uranium?

   d) Uranium may be processed to increase the fissionable percentage. This process is called:

   e) Name the type of reactor which doesn't require the uranium to be processed in this way.

8. a) Why can't a wind turbine's coefficient of performance be 100%?

   b) What two things can things be can controlled to maximize the coefficient of performance?

   c) What is the biggest single problem of wind power?

9. a) Do photovoltaic cells produce AC or DC power?

   b) What is the biggest single problem of photovoltaic cells?

10. What is cogeneration?

11. Some power sources are used to supply base loads and some are used to supply peak loads. Give some reasons to differentiate the sources in this way.

    Base loads Peak loads

12. Problem 3-17 in the text

13. Problem 3-18

14. Problem 3-23

15. Problem 3-24

Answers

12. 21 13. 246575 14. $12.5 \cdot 10^6 \cdot m^2$ 15. 250000

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