Wind Power Test

Rules:

1. You may use one non-programmable calculator.
2. Notes secured in 3-ring binder may be used.
3. Choose the best answer.
4. Show All Work.
5. Use 3.14159 for Pi.
6. Have Fun!

1.Which energy generation method is the most efficient? (1 pt)

A) Hydroelectricity
B)Nuclear
C)Solar
D)Tidal

2. List 3 factors against the use of hydroelectricity. (3 pts)

3. True or False: Flywheels are a method of storing energy. (1 pt)

4. If a turbine has a 7.5 ohm resistor and the voltage measured across the resistor is 100 mV what is the power generated by the motor? (2 pts)

5. A power plant in Chicago is generating 900 MW on a 700 KV line. Assuming the line is 100 kilometers long, with a resistance along the line of 0.2 ohms: (5 pts)

   A: What is the current flowing along the line?

   B: How much power is lost in the lines?

   C: What is the percentage of the power lost?

6. Circle which of the following are methods of energy storage: (1 pt)

   A. Molten Salt
   B. Tidal
   C. Flywheel
   D. Liquid Nitrogen
   E. Uranium

7. What does HAWT stand for? (1 pt)

8. What does VAWT stand for? (1 pt)

9. DC energy is released at a _____ rate, while AC energy can be released at _____ rates. (2 pts)

10. Why is AC energy commonly used for energy transportation? (1 pt)

11. What is Betz' law, and what is the percent associated with it? (2 pts)

12. List 2 things that turbines have been used for. (2 pts)

13. The first electricity producing wind turbine was created in _____. (1 pt)

14. After moving through a turbine, the energy generated from a hydroelectric dam goes into a _____. (1 pt)

15. An airfoil is a wing or blade design designed to maximize _____ and minimize _____. (2 pts)

16. What is the circumference of a turbine that has a blade length of 5 meters? (3 pts)

17. The yaw of the turbine is where the turbine _____ to be in the _____. (2 pts)

18. The pitch of a turbine is: (1 pt)
    A. The height of the turbine
    B. Angle of attack of the blades
    C. Type of blade
    D. None of the above

19. Given the following the dimensions, calculate the following. (3 pts)
Air Density- 1.23 kg/m³
 Wind Speed- 6 m/s
Turbine Radius- 1 meters

A. How much power is being produced by this turbine?

B. How much of this energy can actually be harnessed, and what law or principle governs this generation?

20. The aerodynamic force that pushes up on a turbine is_____, and its' opposing force is _____. (2 pts)

21. If a power plant is generating 100 MW, running on a 20 KV line (20 kilometers long), loses 10 MW of power after running along the line, how much resistance does the line have? (2 pts)

22. In what year was the first electricity producing wind turbine created? (1 pt)

23. How does the pitch of a turbine affect its efficiency? (1 pt)

24. List 3 types of power plants that boil water into steam as a method of generating electricity. (3 pts)

25. Identify the parts of this coal power plant, using the following terms: Generator, turbine, transformer, and boiler. (2 pts)

1._____

2._____

3._____

4._____