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Continuing Education Course #616
Wind Power Primer

1. What is one major factor making wind power expensive?
 - a. maintenance
 - b. renewability
 - c. required backup power systems
 - d. variable wind speed

2. What is the wind power density given an air density of 1.225 kg/m^3 with a wind speed of 5 m/s ?
 - a. 38.3 W/m^2
 - b. 76.6 W/m^2
 - c. $76.6 \text{ kg}^2/\text{s}^3$
 - d. 153.2 W/m^3

3. Wind speed generally _____ with the height of the blade, but wind speed _____ with major changes in _____ above sea level.
 - a. decreases / decreases / height
 - b. decreases / decreases / height
 - c. increases / decreases / elevation
 - d. increases / increases / elevation

4. What is the area swept by a 10 m diameter blade?
 - a. 78.5 m^2
 - b. 100 m^2
 - c. 300 m^2
 - d. 314 m^2

5. What is the approximate expected drop in wind power for a wind turbine is the mile high city of Denver?
 - a. 1%
 - b. 10%
 - c. 15%
 - d. 20%

6. What is the speed of the wind at 100 m turbine blade height using the given information?

Speed of Wind at 10 m Height: 12 m/s

Wind Shear Exponent: 0.14

- a. 1.38 m/s
- b. 2.40 m/s
- c. 10.0 m/s
- d. 16.6 m/s

7. The world meteorological standard reference height for wind speed is 10 m. At what height is expected to double?
- a. 20 m
 - b. 50 m
 - c. 100 m
 - d. depends on shear exponent
8. On a wind map, in general, where would one expect the highest wind speeds?
- a. off shore
 - b. on shore
 - c. near mountains
 - d. swampy areas
9. What Wind Power Class is represented by an approximately 20 mph wind?
- a. 1
 - b. 3
 - c. 5
 - d. 7
10. What type of wind turbine does NOT require a yaw control system?
- a. HAWT
 - b. off shore
 - c. on shore
 - d. VAWT
11. What type of blade device has a wing tip speed faster than the wind?
- a. all blade devices
 - b. drag device
 - c. lift device
 - d. non-commercial devices
12. What is the approximate average power of a 1 MW-hour turbine over a year?
- a. 114 W
 - b. 1140 W
 - c. 1,000,000 W
 - d. 114,000,000 W
13. What is the approximate capacity factor for the turbine in Question 12?
- a. 1%
 - b. 10%
 - c. 11%
 - d. 14%
14. What is the Annual Energy Production of a 10 MW turbine operating at 0.5 capacity?
- a. 10 MWh
 - b. 5,000 MWh
 - c. 43,800 MWh
 - d. 87,600 MWh
15. What is the electrical parameter that is difficult to maintain during large load changes or wind speed for a wind turbine?

- a. frequency of 60 Hz
- b. number of poles
- c. power in MW
- d. rated current

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