ECE 333 Green Electric Energy - Quiz 4

Thursday, October 19, 2017

Duration: 20 minutes

Name: _____ last 4 digits of your UIN:_____

Closed book, closed notes, cell phones are not allowed.

Show all you work and always indicate the units, as appropriate.

Problem 1 [100 points]:

Suppose a wind turbine has a cut-in wind speed of 7 *m/s* , a rated wind speed of 15 *m/s* and a cut-out wind speed of 20 *m/s*. Take the air density as 1.225 kg/m^3.

a. **[20 points] State** the general expression of the Weibull *p.d.f.* $f_{\underset{\sim}{V}}(v)$ of the wind speed
b. **[30 points] Determine** the average wind speed and the average wind power density if the winds have the Rayleigh statistics with scale parameter c=11
c. **[25 points] Determine** how many hours per year in average the turbine will be shut down because of excessively high-speed winds
d. **[25 points] Compute** how much energy per year would be produced for winds blowing at or above 15 *m/s* if the wind turbine has rated power of 1 *MW*