

## ECE 333 Green Electric Energy - Quiz 7

Thursday, November 30, 2017

Duration: 20 minutes

Name: \_\_\_\_\_ last 4 digits of your UIN: \_\_\_\_\_

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

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

### Problem 1 [70 points]:

Suppose you are hired as a consultant on a project for a  $PV$  system for a Daggett (CA) house that is designed to generate 6,000  $kWh$  annually. Assume that PVs have a 15 % efficiency and the temperature-related derate factor  $\chi'=0.7$ . The key cost components for the project are:

<i>component</i>	<i>costs(\$)</i>
<i>PVs</i>	$4.10/W$ (DC)
<i>inverter</i>	$1.10/W$ (DC)
<i>tracker</i>	$390 + 105/m^2$
<i>installation</i>	4,300

Your client asks you to compare the total costs for the installation of an array with a single – axis tracker with the installation of a fixed array with a  $-15^\circ$  tilt angle.

- a. [30 points] Calculate the total costs of an array with a single – axis tracker. (The average daily insolation of an array with a single – axis tracker in Daggett is:  $9.1 \text{ kWh}/m^2 - d$ ).

b. [30 points] **Calculate** the total costs of a fixed array with a  $-15^\circ$  tilt angle. (The average daily insolation of a fixed array with a  $15^\circ$  tilt angle in Daggett is:  $6.5 \text{ kWh/m}^2 - d$ ).

c. [10 points] **State** whether you would propose your client to invest in a fixed array with a  $-15^\circ$  tilt angle or in an array with a single – axis tracker, **provide** the rationale for your selection.

**Problem 2 [30 points]:**

**Circle** the correct answer for each statement below –either **True** or **False**.

a. [10 points] *CSP* plants with *TES* tend to be cheaper and have lower *c.f.s*, and lack the capability to shift generation outside the sunrise–sunset periods.

True \_\_\_\_\_ False \_\_\_\_\_

b. [10 points] For a loan over several years, almost all of the first year payments constitute the interest due, with a very small repayment of the loan principal, while the opposite allocation occurs towards the end of the loan life.

True \_\_\_\_\_ False \_\_\_\_\_

c. [10 points] Behind–the–meter *PV* systems are generally large farms with power outputs sold by their owners into the wholesale electricity markets.

True \_\_\_\_\_ False \_\_\_\_\_