

ECE 333 Green Electric Energy

Quiz 1

Tuesday, September 26, 2017

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

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

Duration: 20 minutes

Name: _____ last 4 digits of your UIN: _____

Problem 1: [100 points]

Circle the correct answer for each statement below –either True or False or *a.*, *b.* or *c.*.

(i) [25 points] Under the assumption that $g = 10 \text{ m/s}^2$, the power to lift up a 1 kg mass to a height of 6 meters in 2 seconds is 30 Joules/sec.

True _____ False _____

(ii) [25 points] The voltage levels 115, 138, 161 and 230 kV are considered to belong to the extra high voltage (EHV) classification.

True _____ False _____

(iii) [25 points] The total US installed wind capacity in 2016 is

a. 820 MW

b. 8.2 GW

c. 82 GW

(iv) [25 points] The global PV solar capacity installed by the end of 2016 is

a. 3.07 GW

b. 30.7 GW

c. 307 GW

Problem 2: [100 points]

Consider a circuit, where a $100\text{-}V$ source, rated at $3,000\text{ VA}$, supplies a single-phase electric motor. An ammeter on the motor load indicates that the current is 20 A and lags by $\frac{\pi}{3}$ radians with respect its voltage.

(i) **[60 points]** Evaluate the power factor of the motor **load**. **Determine** the average value of the real power drawn by the motor **load**. **Draw** the power triangle of the **load** in the circuit. **Indicate the** real power, the reactive power, and the apparent power of the **load**.

(ii) **[40 points]** Assume that the source power factor equals that of the load, and there are no other elements in the circuit. Under these conditions, with the power factor maintained at its specified value determined in (i), **determine** the amount of additional load in W of the real power that the source can supply without the violation of its $3,000\text{-VA}$ rating.