NPRE 470

TAKE HOME EXAM

Turn in by 5pm Monday, May 9, 2011

***Slide under Dr. Nie Luo’s door and within an hour send an e-mail to him and cc*** [***awest@illinois.edu***](mailto:awest@illinois.edu) ***confirming delivery. Sign the honor pledge on the exam book certifying that you did not receive any help or discuss the exam with others.***

1. Problem 6.4 (a-h)

\*Added parts

1. Suggest a way to increase the total efficiency of the cell in part (h). Confirm your suggestion by redoing the calculation for part (h) with your change.
2. Do 6.12b for the cell model developed here in 6.4.
3. Problem 6.7 (a, b)
4. In 6.7b are the curves for the two over voltages versus current density linear? If not, explain why (for each).
5. Do problem 6.11.
6. Do problem 6. 13 for the cell of 6.7.
7. Do problem 7.4. Also, comment on how an uncertainty in the scan rate of 10% affects results – i.e. is the precise rate essential?

b. Consider Fig. 7.12 and answer the following

-Using a revised sketch, show how the use of a porous bounded Warburg element

instead of an infinite one would affect the Nyquist plot.

-Discuss which of these various representations would be best for a PEM cell and which

is best for a SOFE cell. Be sure to explain your reasoning.

c. Do problem 7.7

d. Sketch current interput plots corresponding to Fig. 7.15 assuming parameters corresponding

to Fig. 7.12.

e. Do problem 7.8. Discuss the affect that a 10% uncertainty in scan state would have on your

solution –i.e. is a highly precise rate essential.