EE 280 - Test 1 Review Checklist (Final Revision, 22 Sep 1999)

Coverage: Anything covered to date in labs, lectures, reading, homework. A large listing (which is not necessarily complete) is provided as follows:

Concepts: know or be able to explain

- Solar Energy AM numbers
- Solar Cells/ Panels: $V_{OC}$, $V_{MP}$, $I_{SC}$, $I_{MP}$, $J_{SC}$, FF
- Characteristic curve, Max Power Point
- Matching load to Max Power Point
- $$/kWhr costs of various generation types
- Photovoltaic system design considerations
- Foot-Candles, Lux, lumens
- Luminous flux (lumens), radiant flux (watts)
- Illumination intensity, luminosity vs. wavelength
- Solar Cell Equivalent Circuit
- Battery electrolyte and plate materials
- Battery plate reactions - acid vs. alkaline
- Freezing, specific gravity
- Sulfation, memory effects
- Charging efficiency
- Volts/Cell
- Temperature effects
- Battery Equivalent Circuit
- Battery Loading Characteristic
- Maximum power transfer

Calculations, Determinations:

- Relate solar cell maximum power to FF, $V_{OC}$, $V_{MP}$, $I_{SC}$, $I_{MP}$, $\eta$
- Determine parameters of battery equivalent circuit
- For given load, use equivalent circuit to calculate battery terminal voltage
- Conversion of light intensity to incident power per unit area
- Designing solar array to supply a load of given current and voltage
- Basic design of battery bank to supply load of given voltage and current

Format:

The test will be approximately 3 pages long. Problems may be either calculation or short essay. Space for working problems is provided on the test - no additional sheets of paper (except for one equation sheet) are allowed on your desk. Test seating is close-packed, but please spread out as much as possible. As a professor at MTU, I've have not so far had to report cheating on any of my exams. However, to avoid having to deal with MTU Academic Integrity concerns (i.e. cheating) please focus on your own paper as much as possible. Avoid talking and wearing baseball hats or dark glasses. If you have questions, please raise your hand and clear your throat if you need to get attention.

Preparation Hints:

This is a 30-minute timed test. Please come early and get situated. The test will be handed out at precisely 5 minutes after the hour, and collected at precisely 35 minutes after the hour. If you've come to every class, studied the handouts and the recommended web pages, and done the homework and labs, you should be well-prepared for the test.

Your notecard can help you to recall an equation or concept. Unfortunately, you'll not have time to figure out concepts “on the run” during the test. I strongly encourage you to put time in on the course on an ongoing basis, and avoid cramming the night before each test. Ideally, the night before the test should be a relaxed review of lecture notes, homeworks, and reading assignments.