

CS 3651 Review Questions:

1. You purchase a solar panel and charge controller that is rated to produce 18 watts (in full sunlight). You want to use it to charge a very large L-16 (400AH capacity, 12 volt) deep cell battery. Because the battery would be damaged by being fully discharged, you never discharge the battery past the 50% level. If you want to fully charge the battery (bring it from 50% to 100% capacity), how many hours of full sunlight do you need?
2. Your summer vacation cabin on the lake is well insulated and small. The cabin's total average electrical usage is 250 watts an hour (averaged over all 24 hours in a typical day). You want to set up a battery bank that is capable of powering your cabin for two days continuously (without draining the batteries past the 50% discharged mark). [For the following questions, ignore issues of loss during electrical storage and conversion.]
 - How many watt/hours does this hypothetical battery bank need to deliver over a 2 day period?
 - How many watt/hours does the battery bank need to be rated (in total) so that 50% of its capacity is equal to or larger than the previous answer?
 - If you were to make up this battery bank from L-16 (400AH capacity, 12 volt) deep cell batteries, how many batteries would you need?
3. You are wiring a house and connect a standard 15 Amp circuit breaker to all eight (8) 120v outlets in the living room. The new homeowner installs a large screen TV that takes 400 watts, and an 1800 watt space heater in the living room, plugging them into two of the eight outlets. Will he be able to watch the SuperBowl and heat the room at the same time? Why or why not?
4. Draw an H-Bridge with a battery, 4 switches and a motor. The positive terminal on your battery should be labeled with a "+". Your motors should have 2 wires (A and B). Assume the motor spins "forward" when A is connected to the positive power supply and B is connected to ground. Label the four switches in your H-Bridge S1-S4. Below the drawing, create a table showing the switch state for all four switches that will make the motor go forward, backwards, coast, and brake. Also list two switches that should NEVER be closed at the same time, or a short circuit (shoot-through) will occur.

Draw a simple transistor circuit schematic for a current buffer that would be suitable for turning a motor on and off controlled by a micro-controller.

5. List three sensors that could be interfaced with a USB Bit Wacker to get data into a computer.
6. Next to the following hand-tool labels, draw a picture of the tool and write 1 sentence describing what you might use the tool for:
 - Hammer
 - Screwdriver

- Pliers
- JigSaw
- Hand Drill
- Wrench
- Tape Measure