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Continuing Education Course #202  
Solar Power Part III  
Design Considerations

1. A typical solar system is comprised of what 6 basic components?
  - a. solar panels, low voltage disconnect, batteries, inverter, monitor, and wiring.
  - b. solar panels, charge controller, batteries, generator, monitor, and wiring.
  - c. solar panels, charge controller, batteries, inverter, monitor, and wiring.
  - d. solar panels, charge controller, batteries, inverter, monitor, and grid-tie.
2. Most PV systems will use \_\_\_\_\_ panels?
  - a. Amorphous
  - b. Polycrystalline
  - c. Monocrystalline
  - d. None of the above
3. Rarely will you choose a Charge Controller without \_\_\_\_\_ capability?
  - a. Maximum Power Point Tracking (MPPT)
  - b. Pulse Width Modulation (PWM)
  - c. Pure Sine Wave
  - d. None of the above
4. The purpose of the inverter is to \_\_\_\_\_?
  - a. To reverse the polarity of the batteries
  - b. Convert the electricity into 3-phase power
  - c. Convert the DC volts into AC volts
  - d. None of the above.
5. The monitor meter is used to \_\_\_\_\_?
  - a. Monitor the condition of the batteries
  - b. Help locate the source of any system problems
  - c. More efficiently use a generator when charging the batteries
  - d. All of the above
6. An on-grid system is what?
  - a. A system without a connection to a standard electrical service provided by a power company.
  - b. Allows you to use electricity from the power company or the PV system
  - c. Uses electricity only from the power company
  - d. All of the above
7. When you design a solar system, you must account for every demand the end user has for power.
  - a. True
  - b. False

8. When the temperature decreases, solar efficiency does what?
- a. Decreases
  - b. Increases
  - c. Fluctuates
  - d. No change
9. For adjustable panel mounts during the winter months, the angle of inclination should do what?
- a. Decrease
  - b. Increase
  - c. Not change
  - d. None of the above
10. A two-axis tracking solar panel mount can do what?
- a. Track the sun's movement east to west
  - b. Automatically adjust for the sun's seasonal inclination
  - c. Boost panel output by 20-30%
  - d. All of the above
11. For an installation in the Northwest at a latitude of  $45^{\circ}$  N with an average of 3.5 hours of useable sunlight per day and consisting of ten 230 watt solar panels, how many watt-hrs will the system produce?
- a. 5450
  - b. 6350
  - c. 8050
  - d. 9875
12. A system design calculates a need for 7,680 watt-hours per day, receives 4 hours of useable sunlight daily, and you calculate a demand of 1920 watts per hour. How many solar panels do you need?
- a. Twelve 150-watt panels
  - b. Nine 200-watt panels
  - c. Eight 250-watt panels
  - d. Six 300-watt panels
13. What voltage would be selected to use the smallest wire diameter?
- a. 6V
  - b. 12V
  - c. 24V
  - d. 48V
14. A system is designed for 6,000 watt-hrs per day and you want to provide for 3 days of backup, how many watt-hrs does your battery bank need to be sized for?
- a. 14,000
  - b. 16,500
  - c. 18,000
  - d. 20,500
15. What is the easiest way to identify a flooded cell battery?
- a. The size of the battery posts.
  - b. The letters FLD stamped on the cover.
  - c. The battery caps for maintenance.
  - d. None of the above

16. How many 12-volt 110 amp-hr batteries will you need for an 11,880 watt-hr 24-volt system?
- a. 7
  - b. 8
  - c. 10
  - d. 12
17. The primary purpose of the charge controller is \_\_\_\_\_?
- a. To maintain the proper charging voltage on the batteries.
  - b. To minimize the charge voltage on the batteries.
  - c. To minimize the charge rate to the batteries.
  - d. To maintain a constant charge rate to the batteries.
18. Of the three types of inverters, which produces the best power?
- a. True Sine Wave
  - b. Modified Sine Wave
  - c. Square Sine Wave
19. True or False: All utility providers are required to allow interconnection of a solar system.
- a. True
  - b. False
20. When selecting an inverter, you must select one that has the same nominal voltage as your battery bank.
- a. True
  - b. False
21. What should be the maximum voltage drop allowed when sizing wire from the solar panels to the charge controller?
- a. 1%
  - b. 2%
  - c. 5%
  - d. 10%
22. Which statement is true for batteries and solar panels wired in series?
- a. Current stays the same.
  - b. Current doubles.
  - c. Voltage stays the same.
  - d. None of the above.
23. Two different battery models are available. One is a 105 amp-hr 20-hr rating and the other is a 110 amp-hr 100-hr rating. Which is preferred for use in your system?
- a. The 20-hour rating
  - b. The 100-hour rating
24. True or False: You should not replace an old battery in a bank of batteries with a new battery.
- a. True
  - b. False
25. True or False: If you only need DC power when the sun is shining, there is no need of a charge controller.
- a. True
  - b. False

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