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Continuing Education Course #070
Solar Power Part I
Design for Small Structures-an Introduction

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. Solar system inverters are used for what?
 - a. To make 120 AC volts from DC volts.
 - b. To reverse the polarity of the batteries.
 - c. To reduce the voltage from 24VDC to 12VDC.
 - d. To reset the charge controller.
3. In a typical photovoltaic panel, how many volts does each silicon cell produce?
 - a. 0.5
 - b. 1.2
 - c. 12
 - d. 24
4. Of the different types of solar panel's available today, which is the most efficient?
 - a. Polycrystalline
 - b. Amorphous
 - c. Monocrystalline
 - d. None of the above
5. When the temperature decreases, solar efficiency does what?
 - a. Decreases
 - b. Increases
 - c. Fluctuates
 - d. No change
6. During the winter months, the angle of inclination should do what?
 - a. Decrease by 10 degrees
 - b. Increase by 10 degrees
 - c. Not change
 - d. None of the above
7. 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

8. For an installation in the Southeast at a latitude of 26° N with an average of 4.5 hours of useable sunlight per day and consisting of eight 125 watt solar panels, how many watt-hrs will the system produce?

- a. 2700
- b. 3600
- c. 4500
- d. 5000

9. A system design calculates a need for 6,000 watt-hours per day and receives 5 hours of useable sunlight daily, we calculate that we need a supply of 1200 watts per hour. How many solar panels do we need?

- a. Fourteen 80-watt panels
- b. Ten 100-watt panels
- c. Ten 115-watt panels
- d. Six 200-watt panels

10. What voltage would be selected to use the smallest wire size?

- a. 6V
- b. 12V
- c. 24V
- d. 48V

11. A system is designed for 5,000 watt-hrs per day and you want to provide for 4 days of backup, how many watt-hrs does your battery bank needs to be sized for?

- a. 10,000
- b. 10,500
- c. 20,000
- d. 20,500

12. What is the worst type of battery to be used in a solar system?

- a. Automotive
- b. Golf cart
- c. Marine
- d. RV

13. 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 servicing.
- d. None of the above

14. Which statement below is NOT true of sealed gel batteries?

- a. They do not have vents.
- b. They cannot be used indoors.
- c. They perform better at a constant temperature.
- d. They are spill-proof.

15. How many 12-volt 145 amp-hr batteries will you need for an 18,900 watt-hr 24-volt system?

- a. 10
- b. 11

- c. 12
 - d. 14
16. How would eight 12-volt batteries be wired in a 24-volt system?
- a. One bank of eight batteries in parallel.
 - b. One bank of eight batteries in series.
 - c. Two banks of four batteries in series and parallel.
 - d. Four banks of two batteries in series and parallel.
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. The most effective charge controllers are _____?
- a. Two-stage PWM
 - b. Three-stage PWM
 - c. MPPT
 - d. None of the above
19. Of the three types of off-grid inverters, which produces the best power?
- a. True Sine Wave
 - b. Modified Sine Wave
 - c. Square Sine Wave
20. Inverter stacking provides 240 VAC when connected in series and doubles the output amperage for 120VAC when connected in parallel.
- a. True
 - b. False
21. What does an inverter's Low Voltage Disconnect protect?
- a. The inverter
 - b. The loads
 - c. The batteries
 - d. All of the above
22. The generator is used most efficiently when used in which charge stage?
- a. Bulk
 - b. Absorption
 - c. Float
 - d. Bulk and a portion of the Absorption
23. 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%
24. If you have four 24-volt solar panels rated at 6 amps each, wired for 24 volts, mounted 40 feet from the Charge Controller, you must specify what size wire?

- a. 6 AWG
- b. 4 AWG
- c. 2 AWG
- d. 1/0 AWG

25. 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.

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