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Final Exam

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.