

1 Exam Prep

Photovoltaic Systems, 3rd Ed.

Questions and Answers

1. A solar energy technology that uses unique properties of semiconductors to directly convert solar radiation into electricity is?

- A Solar Array
- B Photovoltaics
- C Solar Cell
- D Photodiodes

2. A device that converts AC power to DC power is a?

- A Transformer
- B Converter
- C Maximum power point tracker
- D Rectifier

3. The array tilt angle is the?

- A Vertical angle between the azimuth and the incidence
- B The vertical angle between horizontal and the array surface
- C The horizontal angle between vertical and the array surface
- D The azimuth and the incidence angle

4. The battery system must include a disconnect when more than how many volts?

- A 6
- B 12
- C 24
- D 48

5. If the PV system uses net metering, the utility electricity meter runs?

- A Forward
- B Backward
- C Forward and backward
- D At a constant speed

6. The overcurrent protection device has a rating of 60. The conductor size should be?

- A 14
- B 12
- C 10
- D 8

7. A PV output circuit composed of four source circuits, each with a rated short-circuit current of 8 A will have a maximum current of the output circuit of?

- A 32 A
- B 40 A
- C 48 A
- D 64 A

8. The required working space for less than 150 V is at least how many feet deep?

- A 1.5
- B 2
- C 3
- D 5

9. To charge a nominal 12V battery, the array must be at least?

- A 12 V
- B 14.5 V
- C 18 V
- D 24 V

10. A 20 foot plastic collector may expand and contract as much as _____ inches in length.

- A 1
- B 2
- C 3
- D 4

11. The conducting medium allowing the transfer of ions between battery cell plates is?

- A Electrolysis
- B Hydrochloric acid
- C Electrolyte
- D Array

12. Modules are typically connected together with?

- A Copper tightening bands
- B CPVC or PEX tubing
- C Internal enclosed connectors
- D External exposed connectors

13. The gas burner is usually located?

- A At the mid-point of the system
- B At the bottom of the tank
- C At the top of the tank
- D Inside the tank

14. The term panel typically refers to?

- A A group of judges usually consisting of at least one building official and one representative from the electric authority
- B A larger group of modules in array usually three physically connected together as an installation unit
- C An assembly of 2 or more modules mechanically and electrically intergrated into a unit
- D Usually three physically connected considered an installation unit

15. If the average solar irradiance is 800 W/m² over 7 hours, what is the total solar irradiation over this period?

- A 8,700 Wh/m² or 8.7 kWh/m²
- B 5,600 Wh/m² or 5.6 kWh/m² I
- C 4,800 Wh/m² or 48.0 kWh/m²
- D 5,600 Wh/m² or 56.0 kWh/m²

16. The condition where essentially no electrical or chemical changes are occurring is known as?

- A Dead level state
- B Plus/minus voltage conditions
- C Roaming
- D Steady state

17. The decomposition of water into hydrogen and oxygen gasses as the battery charges is known as?

- A Gassing
- B Phasing
- C Powering
- D Charging

18. The incidence angle is the angle between the direction of?

- A Radiation and a line exactly perpendicular to the azimuth surface
- B Radiation and a line exactly perpendicular to the array surface
- C Radiation and a line exactly vertical to the array surface
- D Declination and the perpendicular tilt

19. Sizing PV systems for stand-alone operation involves how many sets of calculations?

- A 2
- B 3
- C 4
- D 6

20. A 5,420 W inverter outputting 220 V will have a listed continuous output rating of approximately _____ amps.

- A 24
- B 25.53 I
- C 25
- D 24.63

21. Voltage unbalance should not be more than _____ percent.

- A 3
- B 2
- C 1
- D 10

22. The vertical angle between the sun and the horizon is called the?

- A Solar azimuth angle
- B Solar elevation angle
- C Solar zenith angle
- D Solar altitude angle

23. _____ control and condition the DC power from the array and either direct it to DC I loads or convert it to AC power for use by AC loads.

- A Loads
- B Utilities
- C Arrays
- D Electrical components

24. If the average solar irradiance is 550 W/m² over 6 hours, the total solar irradiation over this period in Wh/m² and kWh/m² is?

- A 2,300 or 2.3
- B 2,000
- C 3,300 or 3.3 I
- D 3,000

25. The size of an interactive system is essentially limited by the?

- A Azimuth
- B Tilt
- C Angle of incidence
- D Space

26. Connecting all of the positive terminals together and all of the negative terminals together placing the battery in _____ condition.

- A Parallel
- B Series
- C Steady state
- D Charge

27. The purpose of a battery is to?

- A Store energy for a later use
- B Convert DC current to AC current
- C Provide inexpensive voltage at the proper time
- D Convert electrical energy into chemical energy during the charging cycle

28. Thyristors have _____ leads.

- A 1
- B 2
- C 3
- D 4

29. In southern coastal climates corrosion rates may be as much as _____ times higher than in the arid desert areas.

- A 100
- B 200
- C 300
- D 400

30. To charge the batteries the array voltage must be?

- A At or equal to the battery-bank voltage
- B No more than 15 percent below the battery-bank voltage
- C No more than 15 percent above the battery-bank voltage
- D Higher than the battery-bank voltage

31. A PV output circuit composed of four source circuits, each with a rated short-circuit current of 6 A will have a maximum current of the output circuit of?

- A 24
- B 25
- C 30
- D 26

32. A problem that should be considered when installing modules directly on the roof is?

- A Hurricane frequency
- B Angle and dangle
- C Array alignment
- D Heat transfer

33. Long-term high temperatures can also lead to premature degradation of?

- A Photovoltaic cell alignment
- B Module encapsulation
- C Array distortion
- D Panel complacence

34. Most of the daily solar radiation occurs between?

- A Dawn and dusk
- B 10:30 am to 5 pm EST
- C 9:00 am and 3 pm
- D 8:30 am and 4:30 pm

35. The solar energy reaching the earth's surface is?

- A Ultra-violet rays
- B Sunrays
- C Heat
- D Terrestrial solar radiation

36. A semiconductor device that converts solar radiation into direct current electricity is a/an?

- A Inverter
- B Converter
- C Array
- D Photovoltaic cell

37. A solar energy collector that absorbs solar energy on a flat surface without concentrating it and can utilize solar radiation directly from the sun as well as radiation that is reflected or scattered by clouds and other surfaces is?

- A Solar energy collector
- B Concentrating collector
- C Flat-plate collector
- D Geothermal collector

38. The maximum current of the output circuit is 26 A. The required overcurrent protection device rating is?

- A 32
- B 32.5
- C 22
- D 22.5

39. The operation point at which a PV device produces its maximum power output lies between the?

- A Short-circuit condition and the open-circuit
- B Array controller and the battery inverter
- C Photovoltaic cell and the maximum power point
- D Discharge focal point and the intake upload

40. A 4,500 W inverter outputting 240 V will have a listed continuous output rating of approximately?

- A 18.7 A
- B 20.8 A
- C 22.9 A
- D 240 A

41. Output circuit wiring applications should use which of the following?

- A USE-2
- B THNN
- C USE
- D TC

42. An important consideration in array mechanical design is?

- A Temperature
- B Weather
- C Location
- D Roof design

43. Given 2 therms, the number of BTU's is?

- A 200,000
- B 20,000
- C 2,000
- D 200

44. The maximum current of the output circuit is 34 A. The required overcurrent protection device rating is?

- A 34 A
- B 42.5 A
- C 51 A
- D 68 A

45. The average solar radiation for a flat-plate collector facing south at a fixed tilt in Tampa, Florida at latitude plus 15 degrees in January is?

- A 4.8
- B 3.5
- C 3.3
- D 4.5

46. A collection of cells that are contained in the same case and connected together electrically to produce a desired voltage is a/an?

- A Array
- B Photovoltaic system
- C Battery
- D Charge controller

47. A charge controller that limits charging current to a battery system by short-circuiting the array is a/an?

- A Shunt charge controller
- B Array charge diverter
- C Panel controller
- D Photovoltaic cell controller

48. A solar energy collector that enhances solar energy by focusing it on a smaller area through reflective surfaces or lenses is?

- A Concentrating collector
- B Biomass energy collector
- C Flat-plate collector
- D Solar energy collector

49. The width of working space in front of any electrical equipment shall be at least?

- A 24 inches
- B 30 inches
- C 3 feet
- D 4 feet

50. An electrical system consisting of an array of one or more PV modules, conductors, electrical components and one or more loads is?

- A Photovoltaic system
- B Hybrid system
- C Grid-Tied system
- D Standalone system

51. The level of the electrolyte must not be allowed to?

- A Spill over
- B Fall below the halfway mark
- C Rise above the top of the battery plates
- D Fall below the top of the battery plates

52. To minimize voltage drop, the charge controller should be installed?

- A No more than 12 feet from the batteries
- B No more than 10 feet from the batteries
- C No more than 5 feet from the batteries
- D Close to the batteries

53. Nearly every PV system that uses a battery requires a/an?

- A Charge controller
- B Inverter
- C Converter
- D Acid flow

54. A charge controller limiting the charging current to a battery system by open-circuiting the array is a/an?

- A Shunt controller
- B Series charge controller
- C Parallel charge controller
- D Array controller

55. PV devices are connected in _____ to achieve a desired voltage.

- A Series
- B Parallel
- C Passive phase
- D Active phase

56. A dynamic structural load resulting in downward lateral or lifting forces is?

- A Nascent force
- B Atomical depression
- C Wind load
- D Pressure dynamics

1 Exam Prep

Photovoltaic Systems

Answers

1	B	4	
2	D	224	
3	B	49	
4	D	345	
5	B	113	
6	C	341	
7	B	312	
		Solution: $4 \times 8 + 25\%$ is 40	
8	C		388
9	B		268
10	A	Photovoltaic Systems, 3rd Edition	40
11	C	Photovoltaic Systems, 3rd Edition	160
12	D	Photovoltaic Systems, 3rd Edition	144
13	B	Solar Water & Pool Heating Manual, 2006	Sys. Corn. 2-5
14	C	Photovoltaic Systems, 3rd Edition	143
15	B	Photovoltaic Systems, 3rd Edition	32
		$800 \times 7 = 5,600$	
		$800 \times 7 \div 1,000 = 5.6$	
16	D	Photovoltaic Systems, 3rd Edition	161
17	A	Photovoltaic Systems, 3rd Edition	166
18	B	Photovoltaic Systems, 3rd Edition	50
19	C	Photovoltaic Systems, 3rd Edition	250
20	D	Photovoltaic Systems, 3rd Edition	479
		$5,420 \div 220 = 24.63$	
21	C	Photovoltaic Systems, 3rd Edition	222
22	D	Photovoltaic Systems, 3rd Edition	58
23	D	Photovoltaic Systems, 3rd Edition	4
24	C	Photovoltaic Systems, 3rd Edition	32
		$550 \times 6 = 3,300 \text{ Wh/m}^2 \text{ OR } 3.3 \text{ kWh/m}^2$	
25	D	Photovoltaic Systems, 3rd Edition	248
26	A	Photovoltaic Systems, 3rd Edition	177
27	D	Photovoltaic Systems, 3rd Edition	99
28	C	Photovoltaic Systems, 3rd Edition	230
29	D	Photovoltaic Systems, 3rd Edition	288
30	D	Photovoltaic Systems, 3rd Edition	266
31	C	Photovoltaic Systems, 3rd Edition	312

		4 X 6 X 125% is 30	
32	D	Photovoltaic Systems, 3rd Edition	278
33	B	Photovoltaic Systems, 3rd Edition	139
34	C	Photovoltaic Systems, 3rd Edition	76
35	D	Photovoltaic Systems, 3rd Edition	37
36	D	Photovoltaic Systems, 3rd Edition	489
37	C	Photovoltaic Systems, 3rd Edition 21	
38	B	Photovoltaic Systems, 3rd Edition	332
		26 X 1.25 = 32.5	
39	A	Photovoltaic Systems, 3rd Edition	134
40	A	Photovoltaic Systems, 3rd Edition	479
		4,500 ÷ 240 = 18.7	
41	A	Photovoltaic Systems, 3rd Edition	319
42	A	Photovoltaic Systems, 3rd Edition	277
43	A	Trade knowledge - A therm is 100,000 btu's	
44	B	Photovoltaic Systems, 3rd Edition	332
		34 + 25 % is 42.5	
45	A	Photovoltaic Systems, 3rd Edition	467
46	C	Photovoltaic Systems, 3rd Edition	160
47	A	Photovoltaic Systems, 3rd Edition	193
48	A	Photovoltaic Systems, 3rd Edition	22
49	B	Photovoltaic Systems, 3rd Edition	388
50	A	Photovoltaic Systems, 3rd Edition	4
51	D	Photovoltaic Systems, 3rd Edition	409
52	D	Photovoltaic Systems, 3rd Edition	206
53	A	Photovoltaic Systems, 3rd Edition	102
54	B	Photovoltaic Systems, 3rd Edition	194
55	A	Photovoltaic Systems, 3rd Edition	144
56	C	Photovoltaic Systems, 3rd Edition	492