



## PHOTOVOLTAIC POWER SYSTEM - MCQS WITH ANSWERS

1. A solar cell converts light energy into \_\_\_\_\_

- a) **Electrical energy**   b) Thermal energy   c) Sound energy   d) Heat energy

Answer: a

Explanation: A solar cell converts light energy into electrical energy. The light energy excites the electron of the solar cell which further flows in the circuit and constitutes the electric current.

2. There are three types of the solar cells.

- a) **True**                      b) False

Answer: a

Explanation: There are three types of solar cells. Single crystal, polycrystal, and amorphous silicon cells are the major types of solar cells.

3. Series and parallel combination of the solar cell is known as \_\_\_\_\_

- a) **Solar array**                      b) Solar light                      c) Solar sight                      d) Solar eye

Answer: a

Explanation: Series and parallel combination of the solar cell is known as Solar array. Shunt diodes are used to avoid the circulating current.

4. Full form of FF in the solar field is \_\_\_\_\_

- a) Form factor                      b) **Fill factor**                      c) Face factor                      d) Fire factor

Answer: b

Explanation: FF stands for Fill factor. It is the ratio of the maximum obtainable power to the product of the open-circuit voltage and short circuit current.

5. Calculate Fill factor using the data:  $P_{max}=15$  W,  $V_{oc}=18$  V,  $I_{sc}=4$  A.

- a) .65                      b) .59                      c) **.20**                      d) .98



Answer: c

Explanation: Fill factor is the ratio of the maximum obtainable power to the product of the open-circuit voltage and short circuit current.  $F.F = P_{\max} \div (V_{oc} \times I_{sc}) = 15/72 = .20$ .

6. Material used for making solar cell is \_\_\_\_\_

- a) Silicon**                      b) Carbon      c) Sodium      d) Magnesium

Answer: a

Explanation: Material used for making solar cells is Silicon. It is a naturally obtained semi-conductor. It has a lower cut-off voltage and minimum energy bandgap.

7. The term photo voltaic comes from \_\_\_\_\_

- a) Spanish                      **b) Greek**                      c) German      d) English

Answer: b

Explanation: The term photo voltaic comes from Greek word phos means light. The volt is the unit of emf which was named after inventor of the battery.

8. A typical output of a solar cell is

- A. 0.1 V                      **B. 0.26 V**                      C. 1.1 V                      D. 2 V

9. The efficiency of a solar cell may be in the range

- A. 2 to 5%                      **B. 10 to 15%**                      C. 30 to 40%                      D. 70 to 80%

<https://www.mechanicaltutorial.com/battery-multiple-choice-questions-and-answers>

10. A module in a solar panel refers to

- a. Series arrangement of solar cells.  
b. Parallel arrangement of solar cells.  
**c. Series and parallel arrangement of solar cells.**  
d. None of the above.



11. The **current density of a photo voltaic cell ranges from**

a. 10 – 20 mA/cm<sup>2</sup>

**b. 40 – 50 mA/cm<sup>2</sup>**

c. 20 – 40 mA/cm<sup>2</sup>

d. 60 – 100 mA/cm<sup>2</sup>

12. . The function of a solar collector is to convert.....

A. Solar Energy into Electricity

B. Solar Energy radiation

**C. Solar Energy thermal energy**

D. Solar Energy mechanical energy

13. What is the rate of solar energy reaching the earth surface?

**a) 1016W**    b) 865W    c) 2854W    d) 1912W

Answer: a

Explanation: The solar energy reaching the surface of the earth is about 1016W whereas the worldwide power demand is 1013W. That means solar energy gives us 1000 times more energy than our requirement.

14. What is total amount of solar energy received by earth and atmosphere?

**a) 3.8 X 10<sup>24</sup> J/year**

b) 9.2 X 10<sup>24</sup> J/year

c) 5.4 X 10<sup>24</sup> J/year

d) 2.1 X 10<sup>24</sup> J/year

Answer: a

Explanation: Even if we use 5% of this energy, it is more than 50 times our requirement. The total solar radiation absorbed by the earth and its atmosphere is 3.8 X 10<sup>24</sup> Joules/year. Except that it is distributed over the area of earth.

15. The process of converting light (photons) to electricity (voltage) is called:

**a)PV effect.**    b)solar cell.    c)radiation.



16. ....converts sunlight directly into solar power (electricity).  
a) battery. **b)solar cell.** c)inverter.
17. The most expensive type of the solar cells is:  
a)AMORPHOUS. b)POLYCRYSTALLINE. **c)MONOCRYSTALLINE.**
18. Which type of solar cells has highest efficiency:  
a)AMORPHOUS. b)POLYCRYSTALLINE. **c)MONOCRYSTALLINE.**
19. 5-Which type of solar cells is more efficient in low lights:  
**a)AMORPHOUS.** b)POLYCRYSTALLINE. c)MONOCRYSTALLINE.
20. All the electricity produced by the solar panels is produced as:  
a)AC. **b)DC.** c) both DC and AC.
21. The device which converts the DC to AC is:  
a)transformer. b)relay. **c)inverter.**
22. Interactive PV systems operate:  
a)stand alone. **b) in parallel with the grid.** c)none.
23. The initial cost of PV systems is is:  
a)low. b)medium. **c)High.**
24. Energy production from PV systems depends on:  
a)location. b) wheather. **c)both a and b**
25. The running cost of PV systems is:  
a)high. **B)low.** c)medium.
26. To insure that your PV system will work all the day you should use:  
a)converter. **B)battery.** c)none.



27. The lifetime of PV system is:

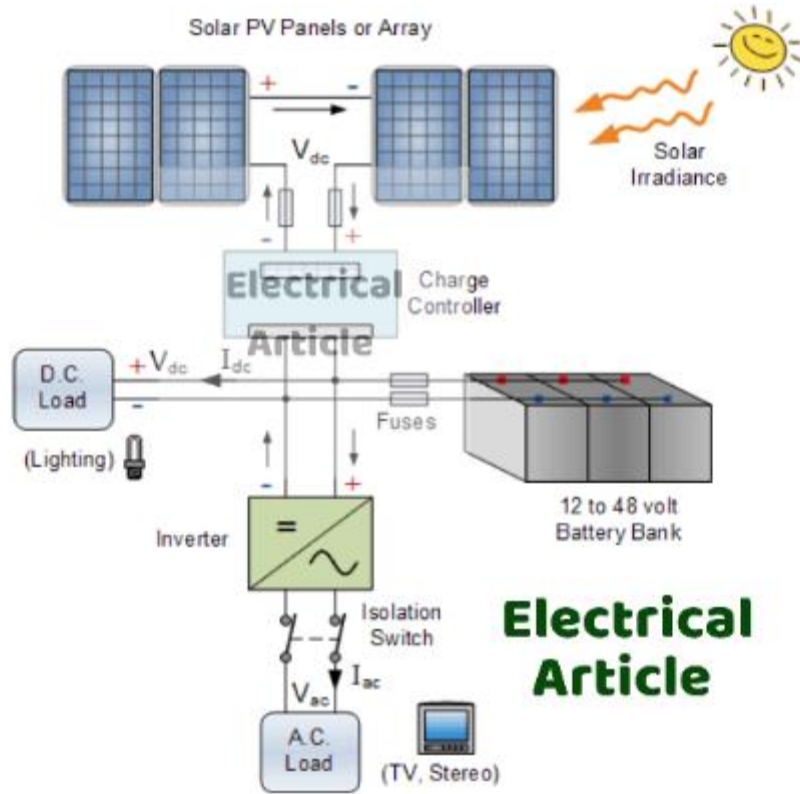
a) long. B)short. C)medium.

28. The efficiency of PV systems in general is:

a)high b)low c)medium.



## 1. What are Components of Solar Photovoltaic Plant?



Components used in Solar Photovoltaic Plant:

1. Solar PV panels
2. Inverter
3. Charge controller
4. ACDB and DCDB
5. Battery (Optional)

1) Solar panel:

The most important part of the solar system is **PV panels**. Generally, PV cells made from the silicon. The cost of solar panel is almost 60% of the total cost of the plant. These cells are connected in series and parallel according to voltage and current requirement. **The combination of solar cells makes a module. The solar panel is a combination of solar modules. A group of solar panels is known as an array.**

Three types of solar panels are available in the market.



1. **Crystalline PV module:** We can make two types of arrangement in Crystalline PV module; single crystalline (**monocrystalline**) and multi-crystalline (**polycrystalline**). The polycrystalline has lower efficiency compare to monocrystalline. But the cost of monocrystalline is high. Both PV module has high conversion rate (convert solar energy to electrical energy) around 12-18 % and life of both modules is very high.
2. **Amorphous silicon PV module:** This PV module is also known as **thin-film PV module**. This module is thin compare to the crystalline PV modules. But, this module use where high efficiency is not a consideration. But the cost is more consideration. The type of PV module has low conversion rate which is just 6-10 %.
3. **Hybrid PV module:** The crystalline cells are surrounded by thin-film of silicon in this type of module. So, this is a combination of both types of PV module. The efficiency of this module is very high and conversion rate of this module is around 20%.

#### 2) Inverter:

Output of solar panel is Direct current (DC). The inverter used to convert DC power into AC power. Because, load (AC, fan, light, etc) works on AC power. So, we require AC power as an output of the plant.

#### 3) Charge controller:

The charge controller used to maintain the output voltage at the rated system voltage. If battery-bank use for backup then charge controller plays an important role to regulate the voltage and preventing of overcharging of the battery. The charge controller allows the battery to charge when it required.

#### 4) ACDB and DCDB:

ACDB is known as **AC Distribution Box**, which places at AC part of the system (after inverter) and DCDB is known as **DC Distribution Box**, which places at DC part of the system (before inverter). These devices use for the protection purpose and contain **MCB/MCCB** and **SPD (Surge protection device)** and a plastic/metallic box.



### 5) Battery:

The battery is an optional part of the solar system. According to installation type, two types of solar plants are available; **grid connected** and **stand alone**. In the grid-connected solar plant, access amount of energy will transmit to the utility and need not connect battery for backup. But, in the case of a stand-alone system, where the grid is not available, we have to use the battery for store access amount of power and for back up.