

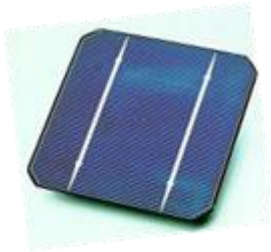
# Source of Energy

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## Periodic Test

**Q.1. State one limitation of solar energy available from solar cells.**

**Answer:** Solar energy being a very good and renewable source of energy has some disadvantages also. Solar cells and their installation require a lot of money and therefore not many people can afford it. Also, they are weather dependent and cannot be used in rainy season or at the time of the year when sun is not visible.



**Q.2. What is the minimum wind velocity required to obtain useful energy with a windmill?**

**Answer:** A windmill is a device (mill) that converts wind energy into electricity by using the blades of the windmill. The minimum velocity required by a windmill to obtain useful energy is 15 kilometers per hour.



**Q.3. Explain why is the solar cooker box covered with a plane glass plate?**

**Answer:** The glass plate does not allow the heat to escape. This phenomenon is used in solar cookers as the solar cooker box is covered with a plane glass plate so as to capture more and more rays of the sun and allow maximum heating of the food placed in the box.

**Q.4. List any four areas where solar cells are being used as a source of energy.**

**Answer:** Solar cells are the renewable source of energy which converts the solar energy (energy from the sun) into electricity. A few areas in which solar cells are used are as follows:

- Solar cells are used in traffic lights and street lights.
- Nowadays solar panels are also used in trains like metros.
- Food can be cooked using solar cookers.
- Some calculators also have solar cells embedded in them.

**Q.5. Write two advantages of classifying energy sources as renewable and non-renewable.**

**Answer:** By classifying sources of energy as renewable and non-renewable:

- We can have a knowledge of how many sources are left and the proper ways they can be used so that we can pass them to our future generations.
- We can look for different alternates of the fast depleting non-renewable resources of energy.

**Q.6. (a) Classify the two fuels – CNG and hydrogen – as renewable and non-renewable.**

**(b) Justify the statement, “Hydrogen is a cleaner and better fuel than CNG”.**

**Answer:** (a) CNG-compressed natural gas. It is a type of natural gas which is a non-renewable source of energy as it takes thousands of years to get replenished. Thus CNG is a non-renewable source while hydrogen is a renewable source.

(b) Hydrogen is a much cleaner fuel than CNG because-

- There is no hydrocarbon emission from hydrogen while CNG produces a lot of hydrocarbon emission which can cause pollution.

**Q.7. What is the importance of hydropower plants in India? Describe how electric energy is generated in such plants.**

**Answer:** India is a country which is surrounded by water on three sides. This water is now used to generate electricity. Thus, hydropower plants are a good source of generating energy in India nowadays.

Generation of electric energy in hydropower plant: -

Electricity production in a hydropower plant works on the principle that- energy always remains conserve and one form of energy can be converted into other.

Water from a great height is poured on a turbine with very great speed. This is done to convert the potential energy of water into its kinetic energy. When this water falls on turbine, it moves with very high speed thus converting this kinetic energy of water into electric energy.

*Koyna Hydroelectric Project is the largest hydroelectric power plant in Maharashtra*

**Q.8. A student constructed a box type solar cooker. He found that it is not working efficiently. What could this be due to? Give any four possible mistakes in the construction and operation of the solar cooker. What can maximum temperature ordinarily be reached inside a solar cooker?**

**Answer:** There can be some basic mistakes which can be done by the student. Once the following mistakes are corrected, his/her solar cooker will start working efficiently-

- 1) he/she might not have painted the cooker black. Black color is the best absorber of heat, thus painting it black will give better results.
- 2) he/she might not have covered the solar cooker with a glass cover. This glass cover traps the heat inside the cooker thus increasing the temperature.
- 3) while constructing a solar cooker one must place spherical reflectors inside the cooker so that they can converge the light at specific point thus giving a better result.
- 4) the sides of solar cooker must be covered with some thermally insulating layer to reduce the heat loss.



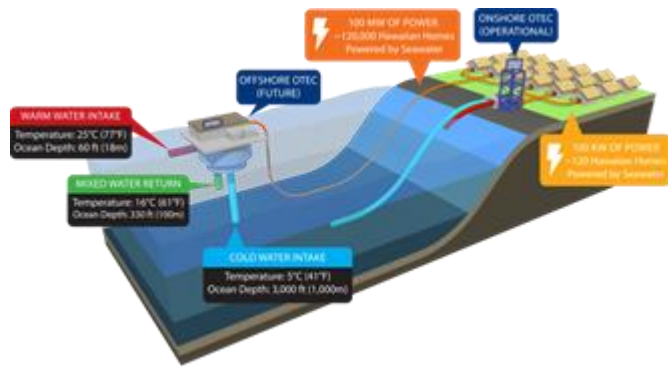
**Q.9. Name the three forms in which energy from oceans is made available for use. What are OTEC power plants? How do they operate?**

**Answer:** The three forms in which energy from oceans is made available for use are-

- 1) wave energy
- 2) tidal energy
- 3) thermal energy

OTEC- ocean thermal energy conversion plant.

Water present at the surface of sea is continuously being heated due to sunlight but, the water present in the deep-sea level is quite cold because sunlight is unable to penetrate deep into the water. So, this difference in the different levels of water in the sea can be utilized efficiently to create electricity. It is done in OTEC i.e. ocean thermal energy conversion plants.



**Q.10. Draw a labelled diagram of floating gas holder type biogas plant and describe its working. Mention any two advantages of using animal dung for making biogas over using it as a fuel in the form of dried dung cakes.**

**Answer:** Biogas plant has a dome-shaped digester in which cow dung is kept. It is completely isolated and thus does not have oxygen in them. In these anaerobic conditions, methanogens (methane-producing bacteria) perform their function & produce methane ( $\text{CH}_4$ ) by digesting the cow dung. Along with methane, carbon-dioxide ( $\text{CO}_2$ ), hydrogen sulphide ( $\text{H}_2\text{S}$ ) is also produced. These gases so produced are recovered from the gas outlet while the remaining slurry can be used as fertilizer.

### Comprehensive Exercises (MCQ)

**Q.1. Which of the following is not a non-renewable source of energy?**

- A. Coal
- B. Petroleum
- C. Wood
- D. Natural gas

**Answer:** Resources which can be used repeatedly over a long period of time without its shortage because they are constantly being replenished by nature are called as renewable resources, while those resources which are not are non-renewable. Among all the given options, wood is a renewable energy resource.

**Q.2. The fraction of sun's energy received on the earth is about:**

- A. 47%
- B. 12%
- C. 38%
- D. 57%

**Answer:** Sun is the ultimate source of energy for our earth. Energy in Sun is due to continuous fusion of H atoms to form He nuclei. Out of the total sun's energy, its 47% energy is received by earth.

**Q.3. Which of the following sources of energy is different from the other?**

- A. Coal
- B. Plants
- C. Petroleum
- D. Lignite

**Answer:** Plant is different from coal, petroleum & lignite. All these are fossil fuels, while plant is not.

**Q.4. Which of the following sources of energy is different from the other?**

- A. Coke
- B. Gobar gas
- C. Bitumen
- D. Anthracite

**Answer:** Gobar gas is a non-conventional source of energy while all other are conventional sources. Coke, bitumen & anthracite have carbon content in them while gobar gas majorly contains methane. Moreover, gobar gas is a clearer fuel than rest of the given options.

**Q.5. Choose the only renewable source of energy from the following:**

- A. Coal
- B. Geothermal power
- C. Uranium
- D. Natural gas

**Answer:** Resources which can be used repeatedly over a long period of time without its shortage because they are constantly being replenished by nature are called as renewable resources, while those resources which are not are non-renewable. Coal, uranium & natural gas are non-renewable resources as they take thousands of years to get replenished. So, the correct answer will be geothermal power which utilises the thermal energy stored in earth's crust.

**Q.6. The longest and the shortest wavelengths (in micron) for red and violet light are respectively:**

- A. 0.3, 0.6
- B. 0.4, 0.7

**C. 0.7, 0.9**

**D. 0.7, 0.4**

**Answer:** VIBGYOR is the visible range of light starting from violet and ending to red colored light. Among all these violet light has the shortest wavelength & red light has the longest wavelength.

for red light:- 0.7 micron

for violet light: - 0.4 micron

**Q.7. The nuclear fuel in the sun is:**

**A. Helium**

**B. Uranium**

**C. Hydrogen**

**D. Radium**

**Answer:** Sun is the ultimate source of energy for earth. The energy of sun is produced by continuous fusion of Hydrogen nuclei to form Helium nucleus. Thus, nuclear fuel in sun is HYDROGEN.

**Q.8. Minimum velocity of wind required for a functional windmill is about:**

**A. 15 km /h**

**B. 15 m/s**

**C. 30 m/s**

**D. Any velocity will do**

**Answer:** The kinetic energy of wind is utilised to generate electricity. In this, the wind energy is used to move the turbine of windmill at high speed which generates electricity. So, the minimum speed required to move the fans of windmill is 15km/hr.

**Q.9. The temperature difference required up to a water level difference of 1000 m for operating an OTEC system is:**

**A. 20°C**

**B. 15°C**

**C. 25°C**

**D. 10°C**

**Answer:** Water present at the surface of sea is continuously being heated due to sunlight but, the water present in the deep-sea level is quite cold because sunlight is unable to penetrate deep into

the water. So, this difference in the different levels of water in the sea can be utilised efficiently to create electricity. A plant where electricity is created from this source is called as OTEC-ocean thermal energy conversion plant. The minimum temperature difference required for an OTEC to function is 20°C.

**Q.10. The energy liberated by wood on burning is:**

- A. 17 kJ
- B. 15 kJ
- C. 20 kJ
- D. 33 kJ

**Answer:** calorific value is the amount of energy produced when combustion of 1 kg of a substance is done. So, the calorific value of wood is 17kJ.

**Q.11. Which of the following is not obtained by the destructive distillation of wood?**

- A. Wood gas
- B. Coal
- C. Acetic acid
- D. Tar

**Answer:** Destructive distillation is a process in which a solid is heated in a completely closed container & all its fumes which contain various volatile substances are collected. So destructive distillation of wood does not show any sign of coal. Thus, the answer is option (b).

**Q.12. The energy liberated by charcoal on burning is:**

- A. 17 kJ
- B. 15 kJ
- C. 20 kJ
- D. 33 kJ

**Answer:** Calorific value is the amount of energy produced when combustion of 1 kg of a substance is done. So, the energy liberated in charcoal combustion is 33 kJ.

**Q.13. Amount of charcoal produced on the destructive distillation of 1 kg of wood is about:**

- A. 0.50 kg
- B. 0.75 kg
- C. 0.25 kg
- D. 1 kg

**Answer:** Destructive distillation is a process in which a solid is heated in a completely closed container & all its fumes which contain various volatile substances are collected. So, when destructive distillation of wood is performed & its volatile constituents are studied, 0.25 kg of charcoal was found.

**Q.14. Which of the following is not a fossil fuel?**

**A. Coal**

**B. Petroleum**

**C. Biogas**

**D. Wood**

**Answer:** Fossils are remains of dead plants, animals & other organisms. These fossils are a great source of energy & thus called as fossil fuels.

Among all the given options, biogas is not a fossil fuel.

**Q.15. The average amount of energy released during the fission of uranium atom is:**

**A. 100 MeV**

**B. 150 MeV**

**C. 20 MeV**

**D. 200 MeV**

**Answer:** Nuclear energy is generated by the process of nuclear fusion or nuclear fission.

Nuclear fission is a process in which nucleus of heavy elements like uranium divides into two smaller nuclei when bombarded with some neutron. During fission of uranium, 200MeV energy is released.

**Comprehensive Exercises (T/F)**

**Q.1. Write true or false for the following statements:**

**Solar energy has the greatest potential of all the renewable sources of energies.**

**Answer:** True

Solar energy is a renewable energy in true senses. We can never ever face any shortage of solar energy. Solar energy will be available till the date of existence of sun which is expected to be 5 more billion years.

**Q.2. Write true or false for the following statements:**

**Reflectors are used in solar heating devices to concentrate the sun heat.**

**Answer:** True



Solar heating devices as the name suggest are devices which use solar energy for heating a substance. While constructing the solar heating devices, reflectors are used to concentrate the sun heat to a single point for getting better results.

**Q.3. Write true or false for the following statements:**

**Black surfaces are poor absorbers of heat.**

**Answer:** False

Black surfaces are actually the best absorbers of heat. This is the reason, why it is suggested to avoid wearing black colored clothes on summer days.

**Q.4. Write true or false for the following statements:**

**Glass cover in a solar heating device allows the short wavelength of ultraviolet radiations to enter the solar cooker.**

**Answer:** True

The glass plate in a solar heating device does not allow the heat to escape. This phenomenon is used in solar cookers as the solar cooker box is covered with a plane glass plate so as to capture more and more ultraviolet rays of the sun and allow maximum heating of the food placed in the box.



**Q.5. Write true or false for the following statements:**

**Spherical reflectors are used to obtain high temperatures in solar heating devices.**

**Answer:** True

Concave reflectors are used in solar heating devices because concave reflectors converge all the radiations to a single focal point and thus can increase the temperature at that specific point.

**Q.6. Write true or false for the following statements:**

**Solar cells are made of semiconductor materials.**

**Answer:** True

Solar cells are made up of Silicon which is a p-type semiconductor. Thus, the given statement is true.

**Q.7. Write true or false for the following statements:**

**A modern selenium solar cell can convert 25% of sunlight into electrical energy.**

**Answer:** True

Selenium makes more efficient solar cells which converts a great percentage of solar energy into electrical energy.

**Q.8. Write true or false for the following statements:**

**Solar cells and solar panels cannot be used in remote areas.**

**Answer:** False

Solar cells & solar panels can be used in remote areas.

Kamuthi solar power project is an ongoing project in Kamuthi town of Tamil Nadu which is going to be the world's largest solar power project. This Kamuthi is a very small town and a remote place in Tamil Nadu.

So, the given statement is proven wrong.