

Question 1:

A solar water heater cannot be used to get hot water on

- (a) a sunny day (b) a cloudy day
(c) a hot day (d) a windy day

Answer:

(b) A solar water heater uses solar energy to heat water. It requires bright and intense sunlight to function properly. On a cloudy day, the sunlight reflects back in the sky from the clouds and is unable to reach the ground. Therefore, solar energy is not available for the solar heater to work properly. Hence, solar water heater does not function on a cloudy day.

Question 2:

Which of the following is not an example of a bio-mass energy source?

- (a) wood (b) *gobar* gas
(c) nuclear energy (d) coal

Answer:

(c) Bio-mass is a source of energy that is obtained from plant materials and animal wastes. Nuclear energy is released during nuclear fission and fusion. In nuclear fission, uranium atom is bombarded with low-energy neutrons. Hence, uranium atom splits into two relatively lighter nuclei. This reaction produces huge amount of energy. In nuclear fusion reaction, lighter nuclei are fused together to form a relatively heavier nuclei. This reaction produces tremendous amount of energy. Hence, nuclear energy is not an example of bio-mass energy source.

Wood is a plant material, *gobar* gas is formed from animal dung, and coal is a fossil fuel obtained from the buried remains of plants and animals. Hence, these are bio-mass products.

Question 3:

Most of the sources of energy we use represent stored solar energy. Which of the following is not ultimately derived from the Sun's energy?

- (a) Geothermal energy
(b) Wind energy
(c) Nuclear energy
(d) Bio-mass

Answer:

(c) Nuclear energy is released during nuclear fission and fusion. In nuclear fission, uranium atom is bombarded with low-energy neutrons. Hence, uranium atom splits into two relatively lighter nuclei. This reaction produces huge amount of energy. In nuclear fusion reaction, lighter nuclei are fused together to form a relatively heavier nuclei. The energy required to fuse the lighter nuclei is provided by fission reactions. This reaction produces tremendous amount of energy. These reactions can be carried out in the absence or presence of sunlight. There is no effect of sunlight on these reactions. Hence, nuclear energy is not ultimately derived from Sun's energy.

Geothermal energy, wind energy, and bio-mass are all ultimately derived from solar energy.

Geothermal energy is stored deep inside the earth's crust in the form of heat energy. The heating is caused by the absorption of atmospheric and oceanic heat. It is the sunlight that heats the atmosphere and oceans.

Wind energy is harnessed from the blowing of winds. The uneven heating of the earth's surface by the Sun causes wind.

Bio-mass is derived from dead plants and animal wastes. Chemical changes occur in these dead plants and animal wastes in the presence of water and sunlight. Hence, bio-mass is indirectly related to sunlight.

Question 4:

Compare and contrast fossil fuels and the Sun as direct sources of energy.

Answer:

Fossil fuels are energy sources, such as coal and petroleum, obtained from underneath the Earth's crust. They are directly available to human beings for use. Hence, fossil fuels are the direct source of energy. These are limited in amount. These are non-renewable sources of energy because these cannot be replenished in nature. Fossil fuels take millions of years for their formation. If the present fossil fuel of the Earth gets exhausted, its formation will take several years. Fossil fuels are also very costly.

On the other hand, solar energy is a renewable and direct source of energy. The Sun has been shining for several years and will do so for the next five billion years. Solar energy is available free of cost to all in unlimited amount. It replenishes in the Sun itself.

Question 5:

Compare and contrast bio-mass and hydro electricity as sources of energy.

Answer:

Bio-mass and hydro-electricity both are renewable sources of energy. Bio-mass is derived from dead plants and animal wastes. Hence, it is naturally replenished. It is the result of natural processes. Wood, *gobar* gas, etc. are some of the examples of bio-mass.

Hydro-electricity, on the other hand, is obtained from the potential energy stored in water at a height. Energy from it can be produced again and again. It is harnessed from water and obtained from mechanical processes.

Question 6:

What are the limitations of extracting energy from –

(a) the wind? (b) waves? (c) tides?

Answer:

(a) Wind energy is harnessed by windmills. One of the limitations of extracting energy from wind is that a windmill requires wind of speed more than 15 km/h to generate electricity. Also, a large number of windmills are required, which covers a huge area.

(b) Very strong ocean waves are required in order to extract energy from waves.

(c) Very high tides are required in order to extract energy from tides. Also, occurrence of tides depends on the relative positions of the Sun, moon, and the Earth.

Question 7:

On what basis would you classify energy sources as

(a) renewable and non-renewable?

(b) exhaustible and inexhaustible?

Are the options given in (a) and (b) the same?

Answer:

(a) The source of energy that replenishes in nature is known as renewable source of energy. Sun, wind, moving water, bio-mass, etc. are some of the examples of renewable sources of energy.

The source of energy that does not replenish in nature is known as non-renewable source of energy. Coal, petroleum, natural gas, etc. are some of the examples of non-renewable sources of energy.

(b) Exhaustible sources are those sources of energy, which will deplete and exhaust after a few hundred years. Coal, petroleum, etc. are the exhaustible sources of energy.

Inexhaustible resources of energy are those sources, which will not exhaust in future. These are unlimited. Bio-mass is one of the inexhaustible sources of energy.

Yes. The options given in (a) and (b) are the same.

Question 8:

What are the qualities of an ideal source of energy?

Answer:

An ideal source of energy must be:

- I. Economical
- II. Easily accessible
- III. Smoke/pollution free
- IV. Easy to store and transport
- V. Able to produce huge amount of heat and energy on burning

Question 9:

What are the advantages and disadvantages of using a solar cooker? Are there places where solar cookers would have limited utility?

Answer:

Solar cooker uses Sun's energy to heat and cook food. It is inexhaustible and clean renewable source of energy. It is free for all and available in unlimited amount. Hence, operating a solar cooker is not expensive.

Disadvantage of a solar cooker is that it is very expensive. It does not work without sunlight. Hence, on cloudy day, it becomes useless.

The places where the days are too short or places with cloud covers round the year, have limited utility for solar cooker.

Question 10:

What are the environmental consequences of the increasing demand for energy? What steps would you suggest to reduce energy consumption?

Answer:

Industrialization increases the demand for energy. Fossil fuels are easily accessible sources of energy that fulfil this demand. The increased use of fossil fuels has a harsh effect on the environment. Too much exploitation of fossil fuels increases the level of green house gas content in the atmosphere, resulting in global warming and a rise in the sea level.

It is not possible to completely reduce the consumption of fossil fuels. However, some measures can be taken such as using electrical appliances wisely and not wasting electricity. Unnecessary usage of water should be avoided. Public transport system with mass transit must be adopted on a large scale. These small steps may help in reducing the consumption of natural resources and conserving them.