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Q1.

Potential energy into electrical energy.

Q2.

Kinetic energy.

Q3.

Kinetic energy of water.

Q4.

Sun.

Q5.

15 km/hr.

Q6.

Use of wind energy

(a) in the past - in flour mills

(b) at present - for generating the electricity through wind-powered generators.

Q7.

Copper tube of solar water heater is painted black because black colour is good absorber of heat.

Q8.

Nuclear fusion.

Q9.

Solar water heater.

Solar cooker.

Solar cell.

Q10.

Plane mirror reflector.

Q11.

About 100°C to 140°C

Q12.

Solar cell.

Q13.

Solar constant is 1.4kW/m^2 or 1.4 kJ/s/m^2 .

Solar energy received by 1 m^2 area in $1\text{ s} = 1.4\text{ kJ}$

Solar energy received by 1 m^2 area in one hour (or 3600 s) = $1.4 \times 3600 = 5040\text{ kJ}$

Q14.

sunlight; electrical.

Q15.

(a) Difference between thermal power plant and hydro power plant:

Thermal power plant uses non-renewable sources of energy like coal, oil or gas; whereas hydro power plant uses renewable source of energy i.e. water.

Thermal power plant causes pollution due to the burning of fossil fuels; whereas hydro power plant is environment friendly.

(b) Thermal power plant causes serious air pollution because it emits harmful gases and fly-ash into the air.

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Q16.

Sun is a renewable source of energy, where as fossil fuels are non-renewable sources of energy.

Q17.

Concave and plane mirrors are used for making solar cooker because concave mirror converges a large amount of sun's rays at a point that is required for high heating and plane mirror reflects the rays of light in the form of a strong beam of sunlight on the top of the box that is required for moderate heating.

Q18.

(a) Glass sheet cover

(b) A plane mirror reflector is used in a box type solar cooker so as to get a strong beam of sunlight after reflection from the mirror.

Q19.

(a) Advantages of using solar cooker

(i) It saves precious fuels like coal, kerosene etc.

(ii) It does not produce any smoke or ash.

(iii) The food cooked in a solar cooker has all its nutrients intact.

(b) Disadvantages of using solar cooker

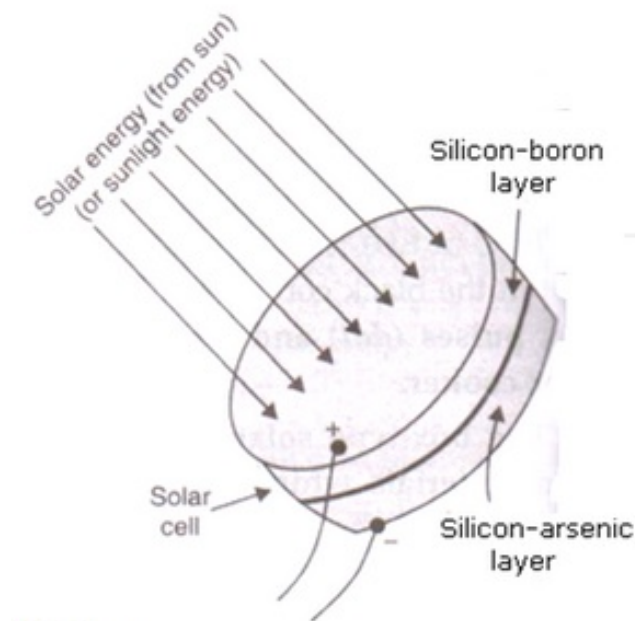
(i) Solar cooker cannot be used during night time.

(ii) If the day-sky is covered with clouds, it will not be possible to cook the food using solar cooker.

(iii) Direction of reflector has to be changed from time to time to keep it facing the sun.

Q20.

(a) Solar cell is a device which converts solar energy directly into electrical energy.



(b) Silicon

(b) Silicon

(c) Use of solar cell:

i. To provide electricity in artificial satellites and space probes.

ii. To provide electricity to remote areas where normal electricity transmission lines do not exist.

iii. To provide electricity to light houses

iv. To operate traffic signals, watches, calculators and toys.

Q21.

(a) Advantage of solar cell

(i) They have no moving parts and require no maintenance.

(ii) They can be set up in remote and inaccessible areas

(b) Disadvantage of solar cell

(i) They are very expensive.

(ii) They are less efficient. They can convert only about 25 % of light falling on them into electricity.

(iii) They cannot work during night time.

Q22.

Solar cell panel consists of a large number of solar cells joined together in a definite pattern. It is used to convert solar energy into electricity.

Advantages of solar cell panel are:-

1. It provides much more electric power than a single solar cell.
2. It is used to provide electricity in remote and inaccessible rural areas.

Q23.

(a) The amount of solar energy received per second by one metre square area of the near earth space (exposed perpendicularly to the sun rays) at an average distance between the sun and the earth, is known as solar constant. Its value is 1.4 kJ/s/m^2 .

(b) Area, $A=5\text{m}^2$; time, $t=10 \text{ min}=600\text{sec}$; $E=4200 \text{ kJ}$.

Solar constant $=E/(Axt)$

$$=4200/(5 \times 600)$$

$$=1.4 \text{ kJ/s/m}^2$$

Q24.

Traditionally, the energy of flowing water has been used for rotating the water-wheels and for driving water-mills to grind wheat to make flour. The traditional use of energy of flowing water has been modified by improvements in technology and it is now used to generate electricity.

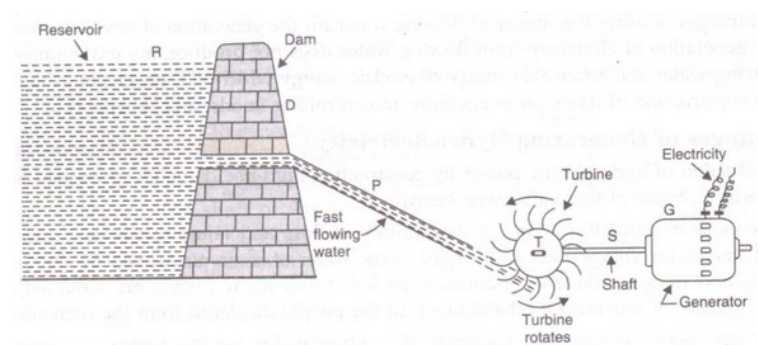
Q25.

Traditionally, wind energy was used through windmills to pump water from a well and to grind wheat into flour. But the traditional use has been modified and now it is used for the generation of electricity.

Q26.

(a) The electricity generated from hydro power plant is known as hydro electricity.

Water is collected in a reservoir at a height, so the water has potential energy stored in it. When the water flows down through this large height, its potential energy gets converted into kinetic energy. The fast flowing water rotates the turbine which is connected to generator through its shaft. The generator produces electricity.



(b) Advantage of producing hydroelectricity:

- (i) It does not cause any environmental pollution.
- (ii) It uses the energy of flowing water, which is a renewable source of energy

(c) Disadvantage of producing hydroelectricity

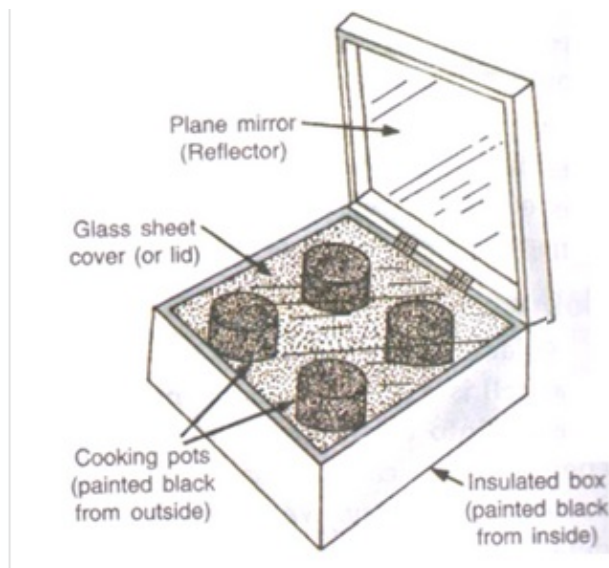
- (i) Large areas of land are required.
- (ii) Large eco-systems get destroyed.

Q27.

(a) Construction and working of solar cooker

A solar cooker consists of an insulated metal box or wooden box which is painted all black from inside. There is a thick glass sheet cover over the box and a plane mirror reflector is also attached to the box.

The food to be cooked is put in metal containers which are painted black from outside. These metal containers are then placed inside the solar cooker box covered with the glass sheet. The sun's rays fall on the reflector, get reflected into the box through the upper glass and get trapped within it.



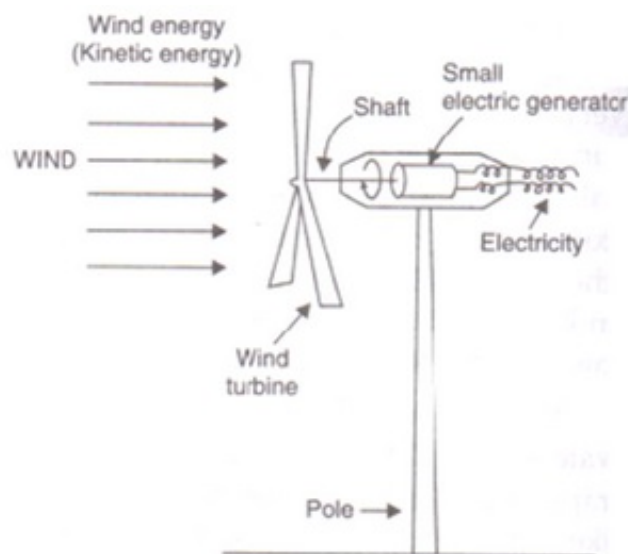
(b) Solar cooker inner body is painted black because black color is a good absorber of heat, so it traps the maximum rays from the sun.

(c) Solar cooker is covered with a glass sheet so as to trap the heat rays in the interior of the box of the cooker.

Q28.

(a) Moving air is known as wind. Wind possesses kinetic energy.

(b) The fast moving wind strikes the wind turbine which starts rotating. The shaft of the wind turbine also rotates and drives the generator which produces electricity.



(c) Advantages of using wind energy for generating electricity:

(i) It does not cause any pollution.

(ii) It is available free of cost.

(d) Limitations of wind energy:

(i) Wind energy farms cannot be established everywhere. They can be established only at those places where wind blows for most part of the year.

(ii) Wind energy farms require large area of land for their establishment.

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Q39.

(a) Electrical energy produced by coal-fired plant = 2000MW = 2000x10⁶W

Electrical energy produced by wind turbine = 300kW = 300x10³W

No. of wind turbine required = 2000x10⁶/300x10³ = 6666.6

So, 6667 wind turbines would be needed to replace the power station.

(b) In actual practice, this no. of wind turbines could not replace the coal-fired power plant because the efficiency of wind turbines keeps changing due to changes in wind speed but the efficiency of steam turbines used in coal-fired power stations remains the same.
Q40.

This is because hot water, being lighter and less denser, rises to the top.

Q41.

The electricity made by the solar cells during day time is stored in rechargeable batteries so that it can be used later on, for example, at night.

Q42.

(a) Solar cells convert solar energy into electrical energy.

While charging the batteries, electrical energy is converted into chemical energy.

During the use of batteries, chemical energy is converted into electrical energy; then electric motor converts electrical energy into kinetic energy (which drives the car).

(b) (i) Batteries are charged quickly.

(ii) Batteries are charged very slowly.

(iii) Batteries are not charged at all.

***** END *****