Sources Of Energy

Assess Yourself

Q. 1. Name two dams/projects which faced opposition over their construction from the local public.

Answer: Tehri Dam at river Ganga

Sardar Sarovar Dam at river Narmada

Q. 2. Name the largest component of bio-gas.

Answer: Methane

Q. 3. List two practical uses of bio-gas in rural areas.

Answer: 1. Used for lighting

2. The slurry left behind is removed periodically and used as an excellent manure, rich in nitrogen and phosphorus

Q. 4. Which power plant works on the earth gravity?

Answer: Hydropower plant

Q. 5. Name the ultimate source of energy of fossil fuels.

Answer: Sun

Q. 6. Which part of the solar energy is responsible for heating the surfaces?

Answer: Only a small part of solar energy reaches the outer layer of Earth's atmosphere (in the form of electromagnetic radiations). Half of it is absorbed while passing through the atmosphere (mostly harmful UV radiations). Rest electromagnetic radiations reach the earth and are responsible for heating

Q. 7. Name the energy obtained from sea or ocean water due to the difference in temperature at the surface and in deeper sections of these water bodies.

Answer: Ocean thermal energy

Q. 8. Name the energy resource which can be utilized in the treatment of cancer.

Answer: Radiation therapy

Q. 9. Which isotope of uranium can undergo fission readily?

Answer: Uranium 238 or U-238

Q. 10. The increase in demand for energy is affecting our environment adversely. List two such effects.

Answer: 1. Burning fossil fuels cause air pollution

2. Assembly of a device with solar cells causes environmental damage.

Q. 11. What are the criteria you would consider when trying to categorise something as a good fuel?

Answer: A good fuel would be one which is:-

Easily accessible

Easy to store and transport

Economical

And would do a large amount of work per unit volume or mass

Q. 12. How does burning of fossil fuels cause air and soil pollution?

Answer: Burning fossil fuels (coal and petroleum) cause air pollution.

The oxides of carbon, nitrogen and sulphur that are released on burning fossil fuels, they are acidic oxides. This lead to acid rain which affects air and water resources.

Increased emissions of Carbon dioxide gas contribute to greenhouse effect.

Q. 13. It is advantageous to convert bio-mass into a bio-gas rather than burning bio-mass directly. Why?

Answer: Biogas is produced from biomass (plant and animal products).

Biogas is more advantageous because

Excellent fuel, which is 75% methane

Burns without smoke

Leaves no residue like ash in wood, charcoal and coal burning

High heating capacity

Slurry left behind can be used as a manure

Q. 14. How is the supply of electricity maintained by a wind mill when there is no wind? By a solar panel when there is no sun?

Answer: Backup facilities like storage cells take care of energy needs, during a period when there is no wind

Solar cells convert solar energy into electricity. A typical solar cell can produce a voltage of 0.5-1 V, which can produce an electricity of 1 W

Q. 15. State the energy conversion taking place in the solar cell panel. For what purpose, solar cell panel is used? State its two main advantages.

Answer: The energy conversion taking place in a solar panel, solar energy→ electricity

Solar cells combined in an arrangement is called a solar panel. The purpose of the solar panel is to harness solar energy and deliver enough electricity for practical use.

The two main advantages of solar panel are-

•No moving parts, require less maintenance and work satisfactorily without a focusing device.

•They can be set up in remote or inaccessible Hamlets, or very sparsely inhabited areas, in which laying of power transmission line may be expensive or not commercially viable.

Q. 16. List in tabular form three distinguishing features between a thermal power plant and a geothermal power plant.

Answer:

	Thermal power plant	Geothermal power plant
Source	Burning of fossil fuels in the power stations to produce steam, which further runs the turbine.	The 'hotspots', areas where molten rocks formed in the earth's crust are pushed up because of geological changes and trapped. When underground water comes in contact with this hotspot, steam is produced This steam is routed through a pipe to a turbine and generate electricity
Commercial utilization	Transmission of electricity more efficient than transporting coal and petroleum over same distance, hence located near oil fields	The cost of production would not be much, but very few commercially viable sites
	They are called thermal power plants as heat energy is converted into electrical energy	Sometimes hot water from that that region finds an outlet to the surface, such areas are known as hot springs.

Q. 17. (a) Name two elements which can be used for generation of electricity in a nuclear power plant.

(b) Why could many nuclear power plants not be installed in our country? Give two reasons.

Answer: The nucleus of a heavy atom as such uranium, plutonium and thorium can be used to generate electricity in a nuclear power plant.

Many nuclear power plants could not be installed in our country because

High cost of installation

High risk of environmental contamination.

Q. 18. (a) How does construction of dams across the river get linked with production of greenhouse gases?
(b) How do technological inputs improve the efficiency of bio-mass fuels?

Answer: (a) The vegetation gets submerged under the waters, in a dam. It rots under anaerobic conditions and produces methane, which is a greenhouse gas.

(b) Technological inputs to improve the efficiency of bio mass fuels are:-

(i) Burning wood in a limited supply of oxygen. The water and volatile materials present in the wood get removed and charcoal is left behind.

Charcoal burns flames and is relatively smokeless and with higher heating efficiency.

(ii) Similarly, cow dung, various plant materials like residue after harvesting the crops, vegetable waste and sewage are decomposed in the absence of oxygen to give bio gas.

Q. 19. (a) Bio-mass contains stored energy. Justify it.

(b) How does bio-gas plant help to reduce the problem of pollution?

Answer: (a) bio-mass contains stored energy as:

(i) Biomass (animal and plant products) is used to form biogas

(ii) Biomass does not have a good heating capacity, it produces a lot of smoke

Cow dung, various plant materials like residue after harvesting the crops, vegetable waste and sewage are decomposed in the absence of oxygen to give biogas

Biogas is stored, and drawn through pipes for use

It is an excellent fuel, gaseous state, non-polluting and high heating capacity

The slurry left behind can be used as manure, rich in nitrogen and phosphorus

(b) Biogas reduces pollution in the following ways:

It burns without smoke, leaves no residue like ash in wood, charcoal and coal burning.

It provides a safe and efficient method of waste disposal, besides supplying energy and manure.

Q. 20. What is meant by wind energy farm? Write one of its practical applications. Give any three limitations of using wind energy farm.

Answer: Number of windmills erected over a large area is known as wind energy farm.

The practical application of a windmill farm is energy output of each windmill in the farm is coupled together to get electricity at a commercial scale.

Limitations of using a wind energy farm

• Wind energy farms can be established only in those areas where wind blows for a greater part of the year

• Wind speed should be higher than 15km/hr to maintain the speed of turbine

• There should be some backup facilities like storage cells, to take care of energy needs during a period when there is no wind.

Q. 21. List three energy sources that are considered to be inexhaustible. State three reasons in support of your answer.

Answer: Solar energy: a renewable source of energy, the energy produced through nuclear fusion

Wind energy: wind is also a renewable source of energy, energy can also be backed up in storage cells

Energy from sea, tidal and wave energy.

Q. 22. Mention why is it not possible to make use of solar cells to meet all our energy needs? State three reasons to support your answer. Also, mention three uses of solar cells.

Answer: It is not possible to make use of solar cells to meet all our energy needs because

Silicon which is used to make solar cells is abundant in nature, but availability of special grade silicon for making the solar cells is limited.

The entire process of manufacture is expensive, silver used for interconnection of solar cells in the panel adds to the cost.

Domestic use is limited due to high costs

Uses of solar cells:

•Artificial satellites and space probes like Mars orbiter use solar cells as their main source of energy.

•Radio or wireless transmission systems or TV relay stations in remote locations use solar cell panels.

•Traffic signals, calculators and many toys are fitted with solar cells.

Q. 23. (a) Which property of water in ocean enables it to act as a storehouse of solar energy?

(b) List three forms in which energy from ocean can be harnessed?
(c) How are they different from each other?

Answer: (a) The water at the surface of the sea is heated by the sun, while the water in the deeper sections is relatively cold. This difference in temperature (heat from the sun) is exploited at ocean thermal power plant to produce electricity.

(b) Tidal energy

Wave energy

Ocean thermal energy

The source of tidal energy is tides, the rise and fall in the level of sea, produced by gravitational pull of moon, on the spinning earth

The source of wave energy is the kinetic energy of waves

The source of ocean thermal energy is the difference in temperature of water, at the surface and in the deeper sections.

Q. 24. State the meaning of the term "hot spot" in the context of earth crust. Write one advantage and one limitation of utilizing energy obtained from the hot spots.

Answer: Hotspot is a region, where a molten rock is trapped. It is formed in the deeper hot regions of Earth's crust, is pushes upwards through geological changes.

When underground water comes in contact with hotspot, a stream is generated. This steam trapped in turbines is routed through a pipe to a turbine and is used to generate electricity.

Sometimes hot water from that region also finds an outlet. It is known as hot springs.

Advantage: cost of production is not much

Disadvantage: there are very few such commercially viable sites, where energy can be exploited.

Q. 25. List any three hazards of nuclear waste. How does the disposal of nuclear waste pose a problem for the plant and animal life?

Answer: The hazards of nuclear waste are:

•The major hazard is Storage and disposal of spent or used fuel - as the uranium is still decaying into harmful subatomic particles.

•Improper nuclear waste storage and disposal result in environmental contamination

•There is a risk of accidental leakage.

Q. 26. Aditya suggests his family to install a solar water heater at their residence. But some of the family members were in favour of installing an electric geyser. Ultimately the family got water heater installed.

(a) Which according to you was correct? Give two reasons in support of your answer.

(b) Mention two possible changes in the thinking of the family members because of the arguments given by Aditya.

Answer: (a) Solar water heater would have been a good choice

No moving parts, little maintenance, work satisfactorily without any focusing device.

Can be set up in remote and inaccessible hamlets or sparsely inhabited areas

(b) Possible changes in family's thinking

(i) Harnessing the natural and greatest source of energy, the sun

(ii) Savings on electricity bills in the future

Q. 27. Slippery surface between colliding tectonic plates resulted in a huge release of energy into the sea and this resulted in massive tsunami. The 2011 devastating tsunami rolled over many parts of Japan and caused huge damages. The disaster also caused the three reactors at Fukushima nuclear power plant to melt down which released dangerous harmful radiations into the surrounding areas and led to national power shortage.

(a) What could be the reason for damage in nuclear reactors?
(b) How did it affect the environment and the people?
(c) Do you think nuclear energy is a future source of energy?

Answer: (a) Breakdown of the power supply and break down of the setup arrangement.

(b) Leakage of the radioactive materials and their harmful radiations

(c) The nuclear energy if utilized with proper safety and conditions can certainly help us as a good source