Exercise-6(C)

1. **State two characteristics which a source of energy must have.**
   Solution:
   The two characteristics that a source of energy must have are as follows:
   - It should be such that it can provide a sufficient amount of useful energy at a steady rate over a long period of time
   - It should be safe and convenient to use, economical and easy to store and transport.

2. **Name the two groups in which various sources of energy are classified. State on what basis are they classified.**
   Solution:
   On the basis of view of availability, the various sources of energy are classified into the following two groups:
   - Renewable or non-conventional sources of energy
   - Non-renewable or conventional sources of energy

3. **What is meant by renewable and non-renewable sources of energy? State two differences between them, giving two examples of each.**
   Solution:
   Renewable sources of energy or non-conventional source – it is a natural source providing us energy continuously
   Non-renewable source of energy or conventional source – it is a source of energy which has accumulated in nature over a very long period of time and cannot be replaced quickly when exhausted.
   Differences are as follows:

Renewable source	Non-renewable source
They can be continuously utilized	Once exhausted, they cannot be utilized
They are replenished naturally over relatively shorter periods of time	Takes a long time for them to be replenished
They are non-conventional sources	They are conventional sources
Example – Sun, Flowing water	Example – Coal, petroleum

4. **Select the renewable and non-renewable sources of energy from the following:**
   (a) Coal
   (b) Wood
   (c) Water
   (d) Diesel
   (e) Wind
   (f) Oil
   Solution:

Renewable sources of energy	Non- Renewable sources of energy
Water	Coal
Wind	Diesel

Wood	Oil

5. Why is the use of wood as a fuel is not advisable although wood is a renewable source of energy?

Solution:

Wood as a fuel is not advisable though wood is a renewable energy source as wood is obtained from trees. Trees are required to be chopped so as to use it as a fuel. On the other hand, burning of wood liberates smoke causing pollution.

6. Name five renewable and three non-renewable sources of energy.

Solution:

The five renewable sources of energy are:

- Sun
- Wind
- Flowing water
- Tides
- Nuclear fuel

The three non-renewable sources of energy are:

- Coal
- Petroleum
- Natural gas

7. What is (i) tidal, (ii) ocean and (iii) geo thermal energy? Explain in brief.

Solution:

(i) Tidal – it is the energy possessed by the rising and the falling of water in tides. Construction of dams across a narrow opening to the sea, is a way to harness tidal energy for electricity generation on a smaller scale.

(ii) Ocean – the ocean water possesses energy in two forms – ocean thermal energy & oceanic wave energy.
Ocean thermal energy – it is the energy that is available as a result of the differences in temperature of water at the surface and at deeper levels of the ocean. Ocean thermal energy is harnessed to produce electricity with the help of a device known as ocean thermal energy conversion plant (OCTEC power plant)
Oceanic wave energy – The kinetic energy possessed by fast moving oceanic waves is known as wave energy.

(iii) Geo thermal energy – it is the heat energy possessed by rocks inside the earth and is harnessed to produce electricity. Deep inside the earth, hot rocks are present at the hot spots, which are responsible to heat up the underground water causing it to turn to steam, which is compressed between rocks at higher pressure. Drilling of holes deep until the hot spots for extraction of steam through the pipes causes the turbines to rotate that are connected to the armature of an electric generator in order to produce electricity.

8. What is the main source of energy for the earth?

Solution:

The main source of energy for the earth is the Sun.

9. What is solar energy? How is solar energy used to generate electricity in a solar power plant?

Solution:

Solar energy is the energy obtained from the Sun.

The devices where heat energy of the sun is used to generate electricity is called as a solar power plant, it consists of a great number of concave reflectors, which comprises of black painted water pipes. The reflectors focus the heat energy obtained from the sun on the pipes because of which the water in the pipes begin to boil generating steam. This steam is used to rotate a steam turbine that drives a generator producing electricity.

10. What is a solar cell? State two uses of solar cells. State whether a solar cell produces a.c. or d.c. Give one disadvantage of using a solar cell.

Solution:

Solar cell – It is an electrical device that converts solar energy directly into electricity aided by photovoltaic effect. They are made from semiconductors such as gallium and silicon with some impurity supplemented to it. When sun rays fall on solar cells, a potential difference is created between its surface because of which the current flows in the circuit that is connected between the opposed sides of the semiconductors.

Two uses of solar cells are:

- It requires no maintenance and can last over a longer duration at zero running cost.
- Useful for inaccessible, remote and secluded places where electric power lines cannot be placed.

Solar cells produce direct current (d.c.)

Disadvantage: The initial cost of solar panels is fairly high.

11. State two advantages and two limitations of producing electricity from solar energy.

Solution:

Two advantages of producing electricity from solar energy –

- Running cost of solar panels are almost nil
- Do not cause any pollution in the environment and are hence the cleanest sources of electricity

Two limitations of producing electricity from solar energy –

- Initial cost of solar panel is sufficiently high
- Low efficiency from conversion of solar energy to electricity

12. What is wind energy? How is wind energy used to produce electricity? How much electric power is generated in India using wind energy?

Solution:

Wind energy is the kinetic energy of the large masses of air in motion.

Wind energy is used in the form of a wind generator to generate electricity by utilizing wind mill to drive the wind generator.

As in 2019, India's total installed power generation capacity is 62.03 TWh, which is nearly 4% of the total electricity generation.

13. State two advantages and two limitations of using wind energy for generating electricity.

Solution:

Two advantages of using wind energy for generating electricity:

- It is a renewable source of energy.
- Does not cause any kind of pollution

Two limitations of using wind energy for generating electricity:

- To establish wind farms, a large area of land is required
- Establishment of wind farm is expensive

14. What is hydro energy? Explain the principle of generating electricity from hydro energy. How much hydro electric power is generated in India?

Solution:

Hydro energy is the kinetic energy possessed by flowing water.

Principle of generating electricity from hydro energy – water flowing from higher altitudes is accumulated at a dam placed at a height. This water is made to fall on a water turbine that is positioned near the base of the dam. The shaft of the turbine is in contact with the armature of a dynamo or an electric generator.

Approximately 14% of the total electricity is generated by the hydro electricity.

15. State two advantages and two disadvantages of producing hydro-electricity.

Solution:

The two advantages of producing hydro-electricity are:

- It is a renewable source of energy
- Does not cause any environmental pollution

Two disadvantages of producing hydro-electricity are:

- Animal and plant life gets destructed due to the construction of dams over the water bodies
- Due to this process the ecological balance in the downstream areas of water bodies such as rivers are disturbed

16. What is nuclear energy? Name the process used for producing electricity using the nuclear energy.

Solution:

Nuclear energy is the energy released when a heavy nucleus is bombarded with slow neutrons causing it to split into nearly two equal and light nuclei resulting in the liberation of enormous amount of energy. During nuclear fission, the net sum of masses of products is comparatively lesser than the total sum of masses of reactants. The mass that is liberated, gets converted into energy. The released energy is nuclear energy.

The process used for producing electricity using the nuclear energy is known as nuclear power plant. It is a set up by the controlled chain reaction of nuclear fission of a radioactive substance like uranium-235 (or plutonium-239).

17. What percentage of total electrical power generated is India is obtained from nuclear power plants? Name two places in India where electricity is generated from nuclear power

plants?

Solution:

Currently, only about 3% of the total electrical power generated in India is obtained from nuclear power plants.

The two places in India from where electricity is generated from nuclear power plants are:

- Tarapur in Maharashtra
- Kaiga in Karnataka

18. State two advantages and two disadvantages of using nuclear energy for producing electricity.

Solution:

Two advantages of using nuclear energy to produce electricity are as follows:

- Enormous amount of energy can be produced with a very small amount of nuclear fuel such as uranium-235
- Energy is released for a long period of time once the nuclear fuel is loaded into the nuclear power plant.

Two limitations of using nuclear energy to produce electricity are as follows:

- Release of harmful radiations in the process which is highly energetic and penetrating. The radiations cause ionization which can be harmful to the body of the workers deployed in nuclear power plants. Hence a high standard protection is required for them
- High level of environmental pollution is caused by the wastes obtained from the nuclear power plants.

19. State the energy transformation in the following:

(i) Electricity is obtained from solar energy
(ii) Electricity is obtained from wind energy
(iii) Electricity is obtained from hydro electricity
(iv) Electricity is obtained from nuclear electricity

Solution:

(i) Light energy transformed into electrical energy
(ii) Mechanical energy transformed into electrical energy
(iii) Mechanical energy transformed into electrical energy
(iv) Nuclear energy transformed into electrical energy

20. State four ways for the judicious use of energy.

Solution:

The four ways with which energy can be used judiciously are:

- Fossil fuels should be used only for limited purposes when no other alternative source of energy is available
- Energy wastage should be avoided
- The practice of chopping down trees must be banned. More trees must be planted
- Efforts should be made to utilize energy in groups/community

21. What do you mean by degradation of energy? Explain it by taking two examples of your daily life.

Solution:
Degradation of energy is the eventual decline in the energy that is useful as a result of friction etc.
Two examples are as follows:

- A large part of electrical energy is wasted in the form of heat energy when electrical appliances are run on electricity.
- A large part of heat energy from the fuel is given out when food is cooked over fire. The liberated energy is of no use, instead causes pollution.

22. The conversion of part of energy into an unuseful form of energy is called _____
Solution:
Degradation of energy

Multiple choice type:

1. **The ultimate source of energy is:**
   (a) Wood
   (b) Wind
   (c) Water
   (d) Sun
   Solution:
   (d) Sun
   The Sun is the ultimate source of energy for all ecosystems.

2. **Renewable source of energy is:**
   (a) Coal
   (b) Fossil fuels
   (c) Natural gas
   (d) Sun
   Solution:
   (d) Sun
   Coal, fossil fuels, natural gas are all non-renewable sources of energy.