SOURCES OF ENERGY

1. **List two nutrients that the slurry left behind in the biogas plant contain.**
   Answer. Nitrogen and phosphorous.
2. **Biogas is also known as gobar gas. Justify.**
   Answer. Starting material for biogas is mainly cow dung. So, it is also known as gobar gas.
3. **List two practical uses of biogas in rural areas.**
   Answer. Practical uses of biogas in rural area are:
   1. It is an excellent fuel which burns without smoke with high heating capacity.
   2. It is also used for lighting.
4. **Name any two fossil fuels.**
   Ans. A good fuel is the one which
   - has high calorific value,
   - is non-polluting,
   - is easy to transport and easily available,
   - has moderate ignition temperature.
5. **What is acid rain?**
   Answer. Acid rain: The rain containing the acidic oxides such as oxides of carbon, nitrogen and sulphur.
6. **Name one fuel used in nuclear reactor.**
   Answer. Uranium-235.
7. **Name any two elements that are used in fabricating solar cells.**
   Answer. Germanium, Silicon.
8. **Name the reaction responsible for large energy production in the sun.**
   Answer. Nuclear fusion.
9. **Write the name of the substance whose vapours are used to run the turbine of the generator of ocean thermal energy plant.**
   Answer. Ammonia.
10. **Mention the minimum temperature difference required between surface water and water at a depth of upto 2 km in an ocean thermal energy plant.**
    Answer. 20 °C or 293 K in trapping geothermal energy
11. **Name the part of a biogas plant where reactions take place in the absence of oxygen.**
    Answer. Digester chamber.
12. **Name the kind of energy possessed by wind and the device used to harness it.**
    Answer. Kinetic energy, wind mill.
13. **List two non-conventional sources of energy.**
    Answer. Geothermal, solar, biomass, water, wind are the non-conventional sources of energy, (any two)
14. **A black surface absorbs more heat radiations as compared to a white or a reflecting surface under identical conditions. List two solar devices which make use of this property in their design.**
    Answer. Solar cooker, solar water heater.
15. **Name any two elements that are used in fabricating solar cells.**
    Answer. Germanium, Silicon.
16. **Bio gas is considered to be a boon to the farmers. Give reasons.**
    Answer.
    1. It is the source of excellent manure, rich in nitrogen and phosphorous which can be obtained from the biogas plant in addition to biogas.
    2. It provides the safe, efficient and profitable disposal method for bio-waste and sewage material.
17. **Why a solar cooker painted black form outside?**
    Answer. Black surface absorbs more heat as compared to white or reflecting surface under identical conditions.

18. **Define fuel. List any two characteristics that you would look for in a good fuel.**
Answer. A substance that produces useful energy when it burn or undergoes a chemical f or nuclear reaction. The fuel such as coal, wood, oil, or gas provides energy when burned. A good fuel is the one which produces a huge amount of heat on burning. It does not produce a lot of smoke and is easily available.
19. **State any three reasons to justify that LPG is considered as an ideal fuel.**
Answer. LPG is considered as an ideal fuel because
It is easy to store, handle and transport.
It produces large amount of heat on burning.
It does not leave any residue on burning,
20. **State any three advantages of charcoal over wood.**
Answer. Advantages of charcoal over wood
It has higher calorific value, i.e. higher heat generating efficiency.
Charcoal does not produce smoke on burning so it is a clean fuel.
It is easier to transport and ready to use in a convenient dry and broken-up form.
21. **Mention the purpose of blackening the interior of a solar cooker.**
Answer. The purpose of blackening the interior of a solar cooker is that the black surface absorbs more heat radiations of incident solar energy (about 98%) as compare to white or other light coloured surface
22. **Why do people oppose the construction of Tehri Dam on the river Ganga and Sardar sarover project on the river Narmada. (Or)**
Mention three disadvantage of producing hydroelectricity by constructing the dams.(Or)
List any three ways in which construction of dams for production of electricity adversely affects the environment of that place.
Answer.
1. Large area is required to build the dam that result rehabilitation of displaced people.
2. Large eco-systems are destroyed when submerged under the water in dams.
3. The vegetation which is submerged rots under anaerobic conditions and gives rise to large amounts of methane gas which leads to a green-house effect.

23. **Bio gas is an excellent fuel. Justify the statement by giving two reasons. Mention the main constituents of bio gas along with its percentage.**
Answer.
(i) It burns without smoke and leave no residue therefore causes no atmospheric pollution.
(ii)Its heating capacity is high, i.e. it has high calorific value. Main constituents of bio gas: The composition of bio gas varies depending upon the nature of organic matter feeding in'the digester and advanced waste treatment technology. The typical composition of bio gas is

Methane	50 – 75%
Carbon dioxide	25 – 50%
Nitrogen	0 – 10%
Hydrogen	0 – 1%
Hydrogen sulphide	0 – 3%

24. **(a) Define tidal energy.**
(b) Explain how the tidal energy is harnessed and write one limitation of the use of tidal energy.
Answer.
(a) Tidal energy: The energy produced by the surge of ocean water during high and low tides due to difference in sea-levels is called tidal energy. The high and low tides occur due to the gravitational pull of the moon. This causes enormous movement of water.
(b) Tidal energy is harnessed by constructing a dam near the shores. During the high tides water flows into the dam and during the low tides, water flows out. This flowing water rotates the turbine, present at the opening of the dam and produces electricity.

25. **Define process of nuclear fission. Writ the steps involved in generating electricity in a nuclear reactor.**

Answer. Nuclear Fission: The process in which a heavy nucleus (such as uranium, plutonium or thorium) is broken into two nearly equal fragments when bombarded with low-energy neutrons and a tremendous amount of energy is released. This process is called nuclear fission.

Steps involved in generating electricity:

1. The fuel rods full of uranium pellets are placed in a nuclear reactor chamber.
2. Low-energy neutrons are bombarded on uranium fuel rod.
3. A self-sustaining fission chain reaction starts that releases energy at a controlled rate.
4. With this heat the reactor converts water to steam at a high temperature and pressure.
5. This high temperature and pressure steam spins generator turbines producing electricity.
6. The steam cools back into water, which can then be used over again.

26. **Solar cooker takes more time as compared to the LPG to boil potato or rice, yet Kunal uses solar cooker for such type of cooking:**

(i) Why does Kunal uses Solar cooker instead of LPG? Give reasons for your Answer.

(ii) Name the phenomenon which is responsible for obtaining high temperature in solar cooker.

Answer.

(a)(i) There are no energy losses while cooking on the solar cooker as the food gets cooked in a controlled environment whereas cooking on the LPG leads to maximum percentage of energy loss.

(ii) Temperature controlled cooking retains the nutrient value of the food.

(iii) Using the solar cooker, LPG can be served which result reduction in the emission of CO_2.

(iv) It saves a lot of prestigious time which is normally consumed for cooking purpose.

(b) Greenhouse effect.

27. **Distinguish between renewable and non-renewable sources of energy. Also give an example of each of these sources.**

Answer.

Renewable Source of Energy	Non-renewable Source of Energy
(i) They are constantly supplied by nature and are inexhaustible.	(i) They do not renew or regenerate and are exhaustible.
(ii) Low cost of operation.	(ii) High cost of operation.
(iii) They produce little or no pollutants. Thus minimum impact on environment, e.g. wind energy, solar energy.	(iii) They produce a lot of pollutants, e.g. coal, petroleum, etc.

28. **State the principle of working of ocean thermal energy conversion plant. Explain how the plant works? Write one essential condition for it to operate properly.**

Answer. Principle of working of OTEC: The water at the surface of the ocean is warmer than the water at deeper depths. This temperature difference can be used by Ocean Thermal Energy Conversion (OTEC) systems to generate electricity.

Working of OTEC:

- In OTEC plant, the energy of warm surface water is used to convert low i boiling point liquid ammonia into gaseous state.
- The vapour of ammonia at high pressure is used to spin the turbines of generators converting the Ocean thermal energy to electricity.

- The used vapour pass through the condenser where cold water, pumped from the deeper parts of ocean condenses ammonia vapour back into a liquid.
- This process is repeated again and again ,to get continuous production of electricity. Essential condition for it to operate properly: The temperature difference between the warmer water at the surface and colder water at depths up to 2 km should be 293 K (20°C) or more.

29. **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:
(i) of limited availability of special grade semiconducting materials such as silicon and germanium.
(ii)solar cells have lower efficiency as they depend entirely on intensity of solar radiation.
(iii) the process of manufacturing of solar cells is very expensive, silver used for interconnection of cells in the panel further adds to the cost.
Uses of solar cells:
(i) They provide electric power to satellites and space probes.
(ii) They provide electric power to off-shore drilling platforms and light houses.
(iii) TV relay stations or wireless transmission systems located in remote areas use solar panels to get electric power.
30. **What are the advantages of nuclear energy?**
Answer. Advantages of nuclear energy are:
    - A small quantity of nuclear fuel is needed to produce a large amount of useful energy.
    - Nuclear power plant produces less atmospheric pollution than thermal power plants, if the nuclear fission reaction is performed properly.
    - Small amount of nuclear fuel can run a nuclear power plant over a long period of time. There is no need of inserting the nuclear fuel in the nuclear reactor again and again in a short period as in case of thermal power plant.
31. **What is a solar cell panel? Mention any three of its applications.**
Answer. A large number of solar cells combined in an arrangement to obtain large electrical power is called solar cell panel.
Applications of solar cell panel are:
It provides the electric power for the:
    - working of artificial satellites stationed in outer space,
    - running of irrigation water pumps by the farmers in rural areas,
    - street lighting in remote areas.
32. **Out of two solar cookers, one was covered with a plane glass slab and the other was left open. Which of the two solar cookers will be more efficient and why?**
Answer. The solar cooker which was covered with a plane glass slab would be more efficient. The glass lid allows the heat radiation from sun to enter the solar cooker but does not allow the reflected heat radiation to escape or go outside the box. Thus, heat trapped inside the box increases the temperature. Glass lid also reduces heat loss due to reflection.
33. **List any three hazards of nuclear waste. How does the disposal of nuclear waste pose a problem for the plant and animal life?**
Answer. Hazards of nuclear wastes are:
    i) Nuclear waste contains radioactive substances which emit harmful nuclear radiations.
    ii) There is a high risk of environmental contamination.
    iii) It is highly toxic.
    Effect of nuclear waste on plant and animal life is:
    The radiations emitted from the nuclear waste penetrate deep inside the human or animal body where they can damage biological cells thereby initiate cancer or causes genetic disease.
    Increased mortality of plants, soil invertebrates and mammals and reproductive losses in plants and animals have also been observed.

34. **(a) Charcoal is a better fuel than wood. Why? .**
(b) How does biogas plant help to reduce the problem of pollution?
Answer.
(a) Charcoal is considered to be a better fuel than wood because:
i) It burns without flames.
ii) It is comparatively smokeless.
iii) It has higher calorific value, i.e. higher heat generating efficiency than wood.
(b) Biogas plant helps to reduce the problem of pollution in the following ways.
i) It provides better sanitation due to safe disposal of bio-waste and sewage material.
ii) Biogas obtained from this plant produces less smoke on burning. (Hi) The residue left can be used as a manure which can be used as an alternative of fertilizers. Thus, it prevents soil and water from degradation.

35. **(a) What is geothermal energy?**
(b) What are the advantages of wind energy?
Answer.
(a) The heat energy obtained from the molten rocks formed in the deeper hot regions inside the earth are called geothermal energy.
(b) Advantages of wind energy are:
a) It is an inexhaustible source of energy.
b) It does not cause any environmental pollution.
c) It is available at free of cost.

36. **(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 biomass fuels?
Answer.
(a) A vast variety of plants get submerged in water, rot under anaerobic conditions and produce large amount of greenhouse gases such as methane.
(b) Traditional uses of biomass fuels are not only efficient but they also produce a lot of pollutants which are hazardous to health. Therefore, technological inputs are necessary to improve the efficiency of these fuels and make them environment friendly. With the help of technology, smokeless chulhas and biogas plants have been designed.

37. **Mention any four limitations in harnessing wind energy on a large scale.**
Answer. Limitations in harnessing wind energy are:
a) Speed of wind is not available at all time and at all places.
b) To establish the wind energy farm, a large area of land is needed.
c) Speed of wind should be higher than 15 km/h to harness the wind energy.
d) Construction of windmill and its installation is very expensive.

38. **What happens when wood is burnt in a limited supply of oxygen? Name the residue left behind after the reaction and state two advantages of using this residue as a fuel over wood.**
Answer. When wood is burnt in a limited supply of oxygen, volatile materials present in it get removed and cooled to get wood tar and wood gas.
The black residue left behind aftqr the reaction is known as charcoal. Advantages of using charcoal as a fuel over wood are:
Burning of charcoal does not produce smoke. On the other hand, wood produces a lot of smoke on burning.
For a given quantity, charcoal produces ,more heat than wood.

39. **Name four gases commonly present in biogas. State two advantages of using this gas over fossil fuels.**
Answer. Methane, carbon dioxide, hydrogen and hydrogen sulphide.
Advantages of using biogas over fossil fuels are:
Biogas burns without smoke, leaves no residue unlike coal.
Biogas is cheaper as compared to fossil fuels.

40. **How are the wastes produced in nuclear power plants different from those produced in a thermal power plants ? What happens to the waste of a nuclear power plant?**
Answer. The waste obtained from nuclear power plants is highly radioactive in nature which emits harmful radiations, whereas waste produced in a thermal power plant is non-radioactive.
Management of nuclear waste is given as follows:
Some products of nuclear waste are buried in sealed steel/lead containers for a long term storage, buried under the ground or dumped in vacated coal mines.
Other waste products transforms into less harmful products or to products with a shorter half life.

41. **In a solar cooker, the following arrangements are made. Write one function of each arrangement.**
(a) The box is made of insulating material such as plastic or wood.
(b) The inner walls of the box are painted black.
(c) The box is covered with a transparent glass sheet.
(d) A plane mirror is hinged at an angle at the top of the box.
Answer.
(a) To avoid loss of heat from solar cooker to the surroundings.
(b) Black surface absorbs more heat radiations of incident energy.
(c) Transparent glass sheet does not allow the reflected heat radiation to go outside the box.
(d) To increase the amount of solar energy incident on the transparent glass sheet.

42. **Describe how hydro energy can be converted into electrical energy. Write any two limitations of hydro energy.**
Answer. Conversion of hydro energy into electrical energy
- High rise dams are constructed on the river to obstruct the flow of water to collect it at a suitable height. The stored water has a lot of potential energy.
- The water from a suitable height is allowed to fall on the blades of a turbine located at the bottom of a dam through a pipe.
- Kinetic energy of flowing water rotates the turbine rapidly. Rotation of turbine helps the armature coil of generator to rotate rapidly in the magnetic field. Thus, hydroelectricity is generated.

Limitations of hydro energy:
(i) All river-sites are not suitable for construction of dams.
(ii) Large ecosystems are destroyed when submerged under the water in dam.