

<b>Chapter 1: Alternate Sources of Energy</b>
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<b>P1</b>
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**1. What is the need for exploring alternate sources of energy?**

- a) The non-renewable reserves in the earth are limited which may get exhausted soon if continued to be used at the current rate.
- b) Use of alternate sources of energy will reduce pressure on fossil fuels making them last longer.
- c) By using alternate sources of energy, pollution being caused can be avoided.

OR

There is a need for exploring sources of energy because the sources of energy are depleting and there is a need for their conservation. It is also becoming difficult to discover new deposits. The measures taken to conserving energy sources are not effective.

**2. Name the non-renewable sources of energy.**

Coal, petroleum & natural gas are non-renewable sources of energy.

**3. Why are the non-renewable sources of energy depleting at a fast rate.**

The non-renewable sources of energy are being used extensively so their reserves are depleting at a fast rate.

**4. Mention the percentage global use of different sources of energy**

Source of energy	Percentage of global use
Coal	46%
Natural gas	23%
Nuclear energy	20%
Hydro-power	7%
Other (renewable)	4%

**5. What are non-conventional sources of energy?**

Energy sources which are abundant, renewable, pollution free, eco-friendly that do not get depleted are called non-conventional sources of energy.

**6. Name some non-conventional sources of energy.**

Solar energy, wind energy, tidal energy, geothermal energy and energy from biomass and wastes.

**7. Mention the characteristics of non-conventional sources of energy.**

Non-conventional sources of energy are abundant, renewable, pollution free and eco-friendly.

**8. How are non-conventional forms of energy useful?**

Non-conventional sources of energy serve two purposes:

- a) They supply energy in a decentralized system.

b) They help in sustaining a cleaner environment.

**9. Mention the differences between conventional and non-conventional sources of energy.**

<b>Conventional sources of energy</b>	<b>Non-conventional sources of energy</b>
1. Energy sources which are being used traditionally for many years and going to deplete over a period	1. Energy sources which do not get depleted.
2. They are non-renewable sources of energy.	2. Usually they are renewable sources of energy
3. Examples: Fossil fuels, Thermal power plants, Hydro power plants.	3. Examples: Solar energy, Wind energy, Geothermal energy.
4. Most of them cause environmental pollution	4. Most of them do not cause environmental pollution

**10. What is solar energy?**

The energy obtained from the sun is called solar energy.

**11. What are the two processes involved in the use of solar energy.**

- a) Conversion of solar energy into heat energy.
- b) Conversion of solar energy into electrical energy.

**12. What is solar constant?**

The amount of energy reaching per square meter of earth's atmosphere is called solar constant. It is equivalent to 1.36kw in 12 hours. Its value is  $1.5 \times 10^{18}$  kwh per day.

**13. How is solar energy converted into heat energy?**

Solar energy falling on the surface of the earth is converted into thermal energy. The heat generated is stored in solar collectors. It is used for purposes like heating of water and cooking of food.

**14. What is a solar collector?**

Solar collector is a device which is used to store the heat generated by radiation of solar energy.

**15. Mention the uses of solar heater.**

Solar heaters are used in drying of food grains and vegetables, seasoning of wood, desalination of marine water.

**16. What is a solar pond?**

Solar pond is a new technology in harnessing solar energy. It is a large scale solar collector with an integrated arrangement for storage of heat energy.

**17. How is solar energy remains trapped in a solar pond?**

When water is heated by solar radiation, hot water from the bottom of the pond rises and reaches the surface. It loses the heat gained to the atmosphere. This makes the water in the pond to remain at a temperature nearer to that of the atmosphere. The loss of heat is

prevented by dissolving salts in the bottom of the pond. It makes the water denser and hence cannot rise to the surface. Thus solar energy remains trapped in the pond.

**18. What is the role of salts in a solar pond?**

**OR**

**Give reason: Salts are dissolved in the bottom of a solar pond.**

The loss of heat from the pond is prevented by dissolving salts in the bottom of the pond. Dissolving salts makes the water denser and hence cannot rise to the surface. Thus solar energy remains trapped in the pond.

**19. How is solar energy converted into electricity?**

Solar energy is converted into electricity by using the principle of photo voltaic effect and device called solar cell.

**20. What is a solar cell?**

A Solar cell is a device which converts solar energy directly into electricity.

**21. Mention the uses of solar cells.**

Solar cells are being used in traffic signals in some cities, lighting lamps and pumping water in rural areas.

**22. Differentiate between solar collectors and solar cells.**

Solar collectors	Solar cells
Solar collector is a device used to store the heat generated by the solar energy	Solar cell is a device used to convert solar energy directly into electricity.

**23. What is biomass?**

Biomass includes wood, agricultural wastes and cow-dung.

**24. What is bio energy?**

Bio energy includes those processes where biological matter such as plant and plant products provide the basis for energy and its conversion.

**25. Mention the advantages of biomass.**

- Biomass offers clean fuel for energy.
- It maintains an unpolluted environment
- It reduces carbon dioxide content in the atmosphere.
- It improves quality and water retention capacity of soil.

**26. What is biogas or gobar gas?**

Biogas is a clean, unpolluted and inexpensive source of energy produced from cow dung. It mainly contains 70% methane.

**27. What are the advantages of biogas or gobar gas?**

- Biogas is a clean and unpolluted fuel.

- b) It helps in obtaining both cooking fuel and enriched manure.
- c) It is suitable for rural areas where cow dung is available in plenty.

**28. Mention the uses of biogas.**

- a) Biogas is used for cooking
- b) The slurry left behind is good manure.
- c) It is used for lighting.
- d) It is used for running small engines.

**29. List two practical uses of biogas in rural areas.**

- a) Biogas is used for cooking
- b) It is used for lighting
- c) It is used to run small engines.

**30. Give reason: Biogas is considered to be a boon to rural areas.**

Biogas is more suitable to rural areas because the raw materials like cow dung, agricultural wastes etc are easily available. It also provides enriched manure which can be used in agriculture.

**31. “Biogas is a better fuel than burning animal dung cakes”. Justify.**

Biogas is better fuel because:

Biogas does not cause pollution, whereas burning dung cakes cause pollution.

It does not leave ash behind after burning whereas burning dung cakes leaves ash after burning.

It can be used for lighting, running small engines whereas dung cake can be used only for cooking.

**32. How is biomass converted into energy?**

Biomass is converted into energy by three processes:

- a) Combustion pyrolysis
- b) Bio gasification
- c) Fermentation

**33. What is combustion pyrolysis?**

Combustion pyrolysis is a process of chemical decomposition at high temperature (upto  $500^{\circ}\text{C}$ ) in total or partial absence of air.

**34. Name the products obtained by combustion pyrolysis.**

Fuel gas, ethanol and charcoal

**35. What is meant by bio gasification?**

Bio gasification is a process of anaerobic digestion of biomass to produce biogas.

**36. What is fermentation?**

Fermentation is the conversion of sugars into alcohol to produce ethane and solid residue fuel.

**37. How is bio diesel prepared?**

The crude oil extracted from the seeds is converted into bio diesel.

**38. What is trans esterification?**

Trans esterification is the process of conversion of crude oil obtained from seeds of plant into commercially useful fuel.

**39. What is the advantage of using Jatropha plant in making bio diesel?**

- a) Jatropha plant grows in any type of soil.
- b) It grows in any kind of climate.
- c) It can be propagated easily through seeds or stem cutting.
- d) It grows very fast.
- e) It is not grazed by animals.

**40. Mention the steps taken by government of Karnataka to encourage the use of bio diesel.**

Government of Karnataka has started schemes to encourage farmers to grow Jatropha in their field during lean periods of agriculture.

The seeds of Jatropha are purchased by the government to extract oil.

Bio diesel is being used to run K.S.T.R.C and B.M.T.C Buses.

**41. Name two plants that are source of biofuel.**

Jatropha and Pongamia pinnata (Honge)

**42. What is wind energy?**

Wind energy is the kinetic energy associated with the movement of large masses of air.

**43. How is wind energy from solar energy? OR Give reason: Wind energy is the converted from of solar energy.**

The differential heating of the atmosphere by the sun causes air movement and produces wind. Thus wind energy is converted from of solar energy.

**44. What are the advantages of wind energy?**

- a) Wind energy is a renewable source of energy.
- b) It is eco-friendly.
- c) It is free and requires no recurring expenses for production.
- d) The total potential of wind energy is very large.

**45. What is a wind turbine?**

Wind turbine is a device used for the purpose of obtaining wind energy.

**46. What is wave energy?**

The energy obtained from movement of large quantities of water up and down in the seas and oceans in the form of waves is called wave energy.

**47. Give reason: Tropical coastline of India, especially the South West coast is highly suitable for establishing wave energy.**

Due to the blowing of wind on the surface of Arabian Sea, very fast sea waves move to the surface. Due to their high speed, sea waves have a lot of kinetic energy.

**48. Give reason: Wave energy is not feasible.**

The cost of energy conversion per unit is very high, since it requires many special equipment to be created near the sea.

**49. Give reason: Wave energy is more reliable than wind energy.**

Since the fluctuations in wave energy are comparatively less than that of wind energy.

**50. What is geothermal energy?**

The energy obtained from the heat of the earth within 10km from the surface is called geothermal energy.

**51. Write a brief note on geothermal energy.**

The word geothermal comes from the words geo means earth and thermal means heat. Geothermal energy is the heat from within the earth. It refers to the heat of the earth within 10km from the surface. It can be used to produce power. It has a temperature of 1300°C.

**52. Name the source of energy which is not directly related to the solar energy.**

Geothermal energy.

**53. How can energy be produced from wastes?**

A huge quantity of wastes is generated in cities and towns. It is also generated in sugar, paper and pulp industries.

**54. List the advantages of non-conventional sources of energy.**

- a) Non-conventional sources do not deplete.
- b) They are renewable sources of energy.
- c) They do not cause environmental pollution.

**Fill in the blanks:**

1. Coal, petroleum & Natural gas are **non-renewable** sources of energy.
2. Solar energy, wind energy, geothermal energy are **non-conventional** sources of energy.
3. Solar energy reaches us in the form of small packets called **photons**.
4. The amount of energy reaching per square meter of earth's atmosphere is called **solar constant**.
5. Solar constant is equivalent to **1.3kw** in 12 hours.

6. The value of solar constant is  $1.5 \times 10^{18}$  kwh per day.
7. The device which is used to store the heat generated by radiation of solar energy is called **solar collector**.
8. The device used in drying of food grains and vegetables, seasoning of wood, desalination of marine water is **solar heater**.
9. The new technology of harnessing solar energy is **solar pond**.
10. First Asian country to establish a solar pond is **India**.
11. In a solar pond, heat is trapped in the pond by **addition of salts** in the bottom of the pond.
12. The first solar pond has been setup in **Bhuj**, in Gujarat.
13. A device which converts solar energy directly into electricity is called **solar cell**.
14. The principle involved in the conversion of solar energy into electrical energy is called **photo voltaic effect**.
15. Plant and plant products are called as **biomass**.
16. Plant organic matter is called **vegetable matter**.
17. The energy obtained from plant and plant products is called **bio energy**.
18. The main component of biogas is **methane**.
19. The process of chemical decomposition at high temperature (upto  $5000^{\circ}\text{C}$ ) in total or partial absence of air is called **combustion pyrolysis**.
20. The process of anaerobic digestion of biomass to produce biogas is called bio gasification.
21. The conversion of sugars into alcohol to produce ethane and solid residue fuel is called **fermentation**.
22. The conversion of crude oil from plant seeds into useful fuel involves a process called **trans esterification**.
23. The plant whose seeds are used in production of bio diesel is **Jatropha, Honge**.
24. Wind energy is converted form of **solar energy**.
25. The ideal speed of wind for production of wind energy is between **8m to 22m per second**.
26. The device used to produce wind energy is **wind turbine**.
27. The largest installation of wind turbines is near **Kanya Kumari** in Tamil Nadu.
28. The energy obtained from movement of large quantities of water up and down in the seas and oceans is called **wave energy**.
29. The energy trapped within 10km of the Earth's surface is called **geothermal energy**.
30. The temperature of geothermal energy is about **1300°C**.

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