CBSE Test Paper 02

Chapter 14 Source of Energy

1. Which is the main constituent of CNG ? **(1)**

   a. Butane
   b. Methane
   c. Ethane
   d. Propane

2. What is present contribution of hydro electric power stations to the electricity generated in India? **(1)**

   a. 20%
   b. 23%
   c. 41%
   d. 33%

3. Match the following with correct response. **(1)**

(1) Nuclear energy	(A) Two light weight nuclei combine to from a big nuclei
(2) Geothermal energy	(B) energy present inside the earth's crust
(3) Fission	(C) Energy obtained from the nucleus of an atom
(4) Nuclear fusion	(D) Breaking of heavy nucleus into two medium sized nuclei

   a. 1-A, 2-C, 3-B, 4-D
   b. 1-B, 2-D, 3-A, 4-C
   c. 1-C, 2-B, 3-D, 4-A
   d. 1-D, 2-A, 3-C, 4-B

4. Which of following is more environment friendly? **(1)**

   a. Burning of charcoal
   b. Burning of fire wood
   c. Burning of diesel

d. Burning of coal

5. Which component of sunlight facilitates the drying of clothes? **(1)**

   a. Ultraviolet light
   b. Visible light
   c. Infrared light
   d. All of these

6. Explain, how does burning of fossil fusels cause water pollution? **(1)**

7. Name two combustible components of biogas. **(1)**

8. What energy transformations occur in a hydro power plant? **(1)**

9. Name any two conventional sources of energy. **(1)**

10. Explain how the energy of flowing water is related to solar energy. **(3)**

11. Name the type of reaction in the sun which produces its energy. List two conditions which are present at the center of sun responsible for this reaction. **(3)**

12. Give one reason as to why L.P.G. is a better fuel than kerosene oil. **(3)**

13. Expand OTEC. On what principle is it based? (**3**

14. What is biogas? Describe the working of a biogas plant with the help of a labelled diagram. **(5)**

15. What are hazards of incomplete combustion ? **(5)**

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Answers

1. b. Methane

   Explanation: Because CNG is made by the compression of natural gas which mainly contains methane gas. So Methane is the main constituent of CNG

2. b. 23%

   Explanation: About 65% of the **electricity** consumed in **India** is generated by thermal power plants, 23% by hydroelectric power plants, 3% by nuclear power plants and rest by 10% from other alternate sources like solar, wind, biomass etc. 53.7% of **India's** commercial energy demand is met through the country's vast coal reserves.

3. c. 1-C, 2-B, 3-D, 4-A

   Explanation:

   i. **Nuclear energy is the energy obtained from the nucleus of an atom**---the energy released during nuclear fission or fusion, especially when used to generate electricity.

   ii. **Geothermal energy is the energy present inside the earth's crust**----**Geothermal energy** is the heat from the Earth. It's clean and sustainable. Resources of **geothermal energy** range from the shallow ground to hot water and hot rock found a few miles beneath the Earth's surface, and down even deeper to the extremely high temperatures of molten rock called magma

   iii. **Fission occurs by breaking of heavy nucleus into two medium sized nuclei**---A schematic **nuclear fission** chain reaction. 1. A uranium-235 atom absorbs a neutron and fissions into two new atoms (**fission** fragments), releasing three new neutrons and some binding energy

   iv. **Nuclear fusion occurs when two light weight nuclei combine to from a big nuclei-**----**nuclear fusion** is a reaction in which two or more atomic nuclei come close enough to form one or more different atomic

nuclei and subatomic particles (neutrons or protons). The difference in mass between the products and reactants is manifested as the release of large amounts of energy.

4. a. Burning of charcoal
   Explanation: Burning of charcoal is more environmental friendly because it is fully a biofuel which has minimum pollution effect. It has least carbon emission.

5. c. Infrared light
   Explanation: The clothes are dried by the process of evaporation. Therefore the part of light which helps in heating is infrared part of the sunlight.

6. Fossil fuels on burning releases harmful gases like SO_2, NO_2, etc which remain in the atmosphere and when rain occurs these gases react with rainwater to form acid rain which fall in the water bodies and cause water pollution.

7. Methane (CH_4) and Hydrogen (H_2) are two combustible components of biogas.

8. In a hydro power plant, potential energy possessed by stored water is converted into electrical energy.

9. Petroleum and Coal are the two conventional sources of energy.

10. When solar energy falls on the water surface then evaporation of water from water surfaces like oceans, rivers and other water bodies takes place to form clouds. The clouds are then taken to distant places by air currents, and ultimately water comes back to the surface in the form of rain and snow. During evaporation, a part of solar energy gets converted into potential energy of water molecules. The potential energy of water molecules gets converted into kinetic energy during rain and snowfall. Thus, energy of water flowing in a river is considered to be an indirect form of solar energy.

11. The nuclear reactions which take place in the sun are the nuclear fusion reactions. Conditions for the following reaction are:

    1. In these reactions, two small nuclei fuse together to form a bigger nucleus, with evolution of large amount of energy (almost three to four times greater than

nuclear fission reaction).

2. These reactions require very high temperatures.

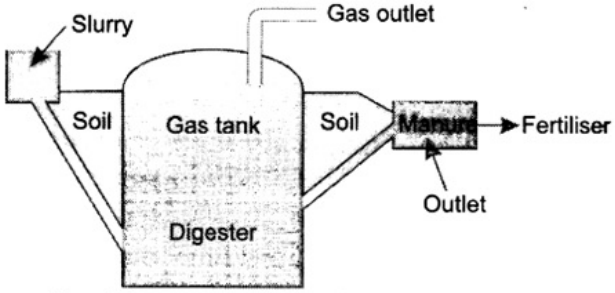
12. Calorific value of L.P.G. is more than kerosene oil. Moreover, its ignition temperature is lower than kerosene oil and thus it starts burning even with a small spark.

13. **OTEC:** Ocean Thermal Energy Conversion.

    OTEC is based on the temperature gradient between upper and lower layers of the ocean.

    There is a difference of $20^{o}C$ between the upper and lower levels. This is exploited to form energy.

14. Biogas is a mixture of methane, carbon dioxide, hydrogen and hydrogen sulphide. The major constituent of biogas is methane. Biogas is produced by the anaerobic degradation of animal wastes like cow-dung or plant wastes in the presence of water.



Fixed dome type biogas plant

The biogas plant has a dome-like structure built with bricks. A slurry of cow-dung and water is made in the mixing tank from where it is fed into the digester. The digester is a sealed chamber in which there is no oxygen.
Anaerobic micro-organisms that do not require oxygen decompose or break down complex compounds of the cow-dung slurry. It takes a few days for the decomposition process to complete and generate gases. The biogas is stored in the gas tank above the digester from which they are drawn through pipes for use.

15. **Hazards of Incomplete combustion :**

    Fuels contain a good amount of carbon. When combustion is complete, most of carbon gets converted into harmless carbon dioxide but when combustion is incomplete, the carbon does not burn properly resulting in following hazards :

    a. Major portion of carbon gets converted into extremely poisonous carbon

monoxide. Carbon monoxide pollutes the atmosphere and causes acute respiratory problems.

b. Sun emits a very large amount of ultraviolet rays which are very harmful to us. These radiations are stopped by layer of ozone gas (O_3) present between 50 to 80 km from earth. thus we are saved from harmful effect of ultraviolet rays. Carbon monoxide produced due to partially burnt carbon combines with ozone and gets converted to carbon dioxide.

   $CO + O_3 \rightarrow CO_2 + O_2$

   This damages ozone layer and hence exposes us to harmful of ultraviolet radiations. If the automobiles are not properly services and tuned, they produce a large amount of partially burnt carbon monoxide. This is the reason as to why the government stresses for periodical pollution tests.

c. During partial combustion some of the unburnt carbon passages into atmosphere in form of soot. There is not only sheer wastage of fuel but also pollutes atmosphere.