

Sources of Energy**EXERCISE****Multiple Choice Questions**

1. Which one of the following does not relate to the solar energy?
(a) Nuclear energy (b) Wave energy
(c) Wind energy (d) Tidal energy
2. The major cause of environmental pollution is the use of
(a) Biomass energy (b) Fossil fuels
(c) Ocean energy (d) Hydrogen as a fuel
3. The coal reservoirs in our country are expected to last for another
(a) 1000 years (b) 250 years
(c) 400 years (d) 500 years
4. A tree usually matures in more than
(a) 15 years (b) 100 years
(c) 50 years (d) 60 years
5. The energy received by the Earth directly from the Sun is approximately which percentage of the Sun's total energy output?
(a) 0.00000005% (b) 0.00005%
(c) 1% (d) 0.001%
6. The approximate value of solar constant is
(a) 1.4 kW/m² (b) 1.4 kW/min
(c) 1.4 kJ/m² (d) 1.4 kW/min
7. The percentage of the solar energy reaching the Earth received by the plants is
(a) 10% (b) 0.1%
(c) 5% (d) 1%
8. An example of renewable source of energy is
(a) Sun (b) Natural gas
(c) Coal (d) Petroleum
9. What percentage of solar energy that strikes the periphery of the Earth is trapped by Earth?
(a) 15% (b) 100%
(c) 75% (d) 47%
10. The fraction of sunlight which consists of infrared radiation is
(a) $\frac{1}{4}$ (b) $\frac{2}{3}$ (c) $\frac{1}{2}$ (d) $\frac{1}{3}$
11. The heat in the sunlight is due to
(a) visible radiation
(b) entire solar radiation
(c) ultra-violet radiation
(d) infra-red radiation
12. Efficiency of modern solar cells is
(a) 60% (b) 25%
(c) 100% (d) 90%
13. The production of solar cookers on a commercial scale in India began in
(a) 1962 (b) 1980
(c) 1950 (d) 1970
14. A good fuel is one which possesses
(a) moderate ignition temperature
(b) high ignition temperature
(c) high calorific value (d) both (a) and (c)
15. Which of the following variety of coal contains the highest percentage of carbon?
(a) Anthracite (b) Peat
(c) Lignite (d) Bituminous
16. The main constituent of natural gas is
(a) hydrogen (b) oxygen
(c) butane (d) methane
17. LPG consists mainly of
(a) butane (b) liquid hydrogen
(c) methane (d) ethane
18. The fraction of the total solar energy received by the Earth is
(a) one billionth (b) one millionth
(c) one hundredth (d) one thousandth
19. The approximate temperature of the surface of the Sun is
(a) 6000°C (b) 10,000°C
(c) 3000°C (d) 30,000°C
20. Which of the following is a primary fuel?
(a) Petrol (b) Diesel
(c) Kerosene (d) Wood
21. Which of the following is a secondary fuel?
(a) Diesel (b) Natural gas
(c) Wood (d) Coal
22. The device which harnesses solar energy directly is
(a) Solar cell (b) Biogas plant
(c) Coal gas plant (d) Natural gas plant
23. U-235 content in natural uranium is
(a) 99.2% (b) 100%
(c) 0.006% (d) 0.714%
24. Energy released in the fission of one nucleus of U-235 is about
(a) 200 MeV (b) 2000 MeV
(c) 1 MeV (d) 20 MeV
25. Energy released in the fission of 1 kg of U-235 is equivalent to energy obtained from burning of coal weighing
(a) 2500 ton (b) 25000 ton
(c) 25 ton (d) 250 ton
26. One MeV of energy is equivalent to
(a) $1.6 \times 10^{13} J$ (b) $1.6 \times 10^{19} J$
(c) $1.6 \times 10^{-13} J$ (d) $1.6 \times 10^{-19} J$

27. One unified atomic mass unit (u) is equivalent to
 (a) 931 MeV (b) 931 eV
 (c) 1 eV (d) 1 MeV
28. Common moderator used in nuclear reactor is
 (a) boron (b) uranium
 (c) graphite (d) cadmium
29. Disposal of nuclear waste is a challenge because it is
 (a) radioactive (b) foul smelling
 (c) too large (d) too heavy
30. Uncontrolled nuclear chain reaction is the basis of
 (a) hydrogen bomb (b) atom bomb
 (c) nuclear reactor (d) none of these
31. If mass equivalent to one mass of proton is completely converted into energy then the energy produced is
 (a) 931.49 MeV (b) 913.49 MeV
 (c) 391.49 MeV (d) 931.49 MeV
32. Most of the fuels are
 (a) carbon compounds with sulphur
 (b) nitrogen compounds with carbon
 (c) carbon compounds with hydrogen
 (d) none of these
33. A nucleus breaks into two parts whose velocity is in ratio 2 : 1. The ratio of their radius is
 (a) $1:2^{2/3}$ (b) $2^{2/3}:1$
 (c) $1:2^{1/3}$ (d) $2^{1/2}:1$
34. Which of the following is a better nuclear fuel?
 (a) Thorium - 236 (b) Uranium - 235
 (c) Neptunium-239 (d) Plutonium - 239
35. When we use biomass to generate electricity we convert - energy locked in the biomass to electrical energy
 (a) chemical (b) kinetic
 (c) nuclear (d) muscular
36. The energy released per unit mass is
 (a) more for fusion than for fission
 (b) more for fission than for fusion
 (c) equal for both fusion and fission
 (d) varies from time to time
37. What sector of the Indian economy consumes most of the nation's petroleum?
 (a) residential (b) commercial
 (c) industrial (d) transportation
38. The ratio of radius of nuclei ${}_{13}\text{Al}^{27}$ and ${}_{52}\text{Te}^{125}$ is
 (a) $\frac{3}{5}$ (b) $\frac{4}{5}$
 (c) $\frac{2}{5}$ (d) $\frac{1}{5}$
39. Which among the following statement is not true about solar cooker?
 (a) It saves fuel.
 (b) It does not create pollution.
 (c) The nutrients of food do not get destroyed.
 (d) It cooks food quickly.
40. Which among the following is not a renewable source of energy?
 (a) Wind energy (b) Ocean energy
 (c) Solar energy (d) Fossil energy
41. Most of the energy we use originally came from
 (a) the sun (b) the air
 (c) the soil (d) the ocean
42. Electrical energy can be produced from
 (a) mechanical energy (b) chemical energy
 (c) radiant energy (d) all of the above
43. Coal, petroleum, natural gas, and propane are fossil fuels. They are called fossil fuels because
 (a) they are burned to release energy and they cause air pollution
 (b) they were formed from the buried remains of plants and tiny animals that lived hundred of millions of year ago
 (c) they are nonrenewable and will run out
 (d) they are mixed with fossils to provide energy
44. Natural gas is transported mainly by
 (a) pipelines (b) trucks
 (c) barges (d) all three equally
45. Global warming focuses on an increase in the level of which gas in the atmosphere?
 (a) ozone (b) sulfur dioxide
 (c) carbon dioxide (d) nitrous oxide
46. Solar, biomass, geothermal, wind, and hydropower energy are all renewable sources of energy. They are called renewable because they
 (a) are clean and free to use
 (b) can be converted directly into heat and electricity
 (c) can be replenished by nature in a short period of time
 (d) do not produce air pollution
47. Today, which renewable energy source provides the India with the most energy?

- (a) wind (b) solar
(c) geothermal (d) hydropower
48. How much of the energy in burning coal reaches the consumer as electricity
(a) 1/3 (one-third) (b) 1/2 (one-half)
(c) 3/4 (three-quarters) (d) 9/10 (nine-tenths)
49. In a nuclear power plant, uranium atoms
(a) combine and give off heat energy
(b) split and give off heat energy
(c) burn and give off heat energy
(d) split and give off electrons
50. A substance which produces a log of heat on burning is called _____.
(a) oxidizing agent (b) biogas
(c) biomass (d) fuel
51. Fuel formed under the earth's surface by the decomposition of organic matter is called
(a) organic fuel (b) biogas
(c) fossil fuel (d) underground fuel
52. Which of the following causes the least pollution when burnt?
(a) Petrol (b) Diesel
(c) Coal (d) Natural gas
53. The radiations emitted by a hot furnace are
(a) ultra-violet (b) infra-red
(c) X-rays (d) microwaves
54. Which of the following is not combustible?
(a) oxygen (b) hydrogen
(c) butane (d) methane
55. Floating generators are used in the sea to harness
(a) tidal energy
(b) wave energy
(c) hydel energy
(d) energy from OTEC power plant
56. The molten material mixed with gases in the mantle of the earth is called
(a) core (b) lava
(c) geyser (d) magma
57. The scientist who first carried out critical nuclear fission reaction is
(a) Otto Hahn (b) Enrico Fermi
(c) Hans Bethe (d) Einstein
58. India exploded her first underground nuclear device at
(a) Kota (b) Ranchi
(c) Jaipur (d) Pokhran
59. The energy of a thermal neutron is about
(a) 0.025 eV (b) 0.25 eV
(c) 0.0025 eV (d) 0.00025 eV
60. Nuclear fusion reactions happens spontaneously in

- (a) the core of the earth
(b) the commercial nuclear reactor
(c) the atmosphere of the sun
(d) the eruption of a volcano

FILL IN THE BLANKS

- An area of 5 m^2 receive..... solar energy for 2 hour if the solar constant is 1.4 kW m^{-2} .
- A heap of wet wood if burnt, produces lot of smoke and leaves a residue. This residue is called.....
- Biogas is a mixture of
- The device used for obtaining energy from flowing water is called
- is the best fuel in terms of energy liberated per gram of fuel.
- Coal gas is a mixture of and
- The efficiency of the modern solar cells from selenium is up to
- Fly ash is used to make
- Bright black variety of coal containing the highest carbon content is
- The combustible components of biogas are..... and
- is a complex mixture of a large number of organic compounds.
- Commercial unit of crude oil is
- Renewable sources of energy are also called sources of energy.
- 1 calorie is Joule.
- The ratio of S.I. units to CGS units of energy is
- Crude petroleum oil is refined by the process known as
- is obtained by distinctive distillation of wood.
- is added to LPG for detection of leakage.
- The main component of LPG is
- Calorific value of natural gas is

TRUE OR FALSE

- A combustible substance serves as the food for fire.
- Wood contains more moisture and volatile impurities than charcoal.
- The solar energy is always available uniformly all the time and at all places.
- Respiration is a slow combustion process.

5. The excessive use of solar energy will pollute the air.
6. Petroleum is a renewable source of energy.
7. Coal gas is an example of primary fuel.
8. Aerobic thermal degradation of wood is called carbonization.
9. One atom of uranium produces 10 times the energy produced by the combustion of an atom of carbon from coal.
10. The approximate value of solar constant is 1.4 J per second.
11. Bioenergy is the solar energy stored by the plants through photosynthesis.
12. Sources of energy which are inexhaustible are called chewable sources of energy.
13. The solar energy is the cause of wind and storm, ocean waves, rain and snowfall.
14. Tidal energy is an exhaustible and non-renewable source of energy.
15. Geothermal energy carried by natural geysers is utilized for generating electricity.
16. The earth surface absorbs about 34% of the total solar radiation reaching the top of the atmosphere.
17. The minimum wind velocity for a wind mill to function is 15 km h^{-1} .
18. Natural gas is not an environment friendly fuel.
19. Natural gas mainly consist of butane.
20. LPG is a byproduct of petroleum refining.

Matrix Match Type

In this section each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in Column-I have to be matched with statements (p, a, r, s) in Column-II.

1.

Column I	Column II
(A) Petroleum	(p) Plant nutrient
(B) Crude oil	(q) Wind mill
(C) Spent dung distillation	(r) Fractional
(D) Moving air	(s) Kerosene

2.

Column I	Column II
(A) Sewage	(p) Charcoal
(B) Wood	(q) Compressed natural gas
(C) Hydropower	(r) Methane gas
(D) Clean fuel	(s) Dam

3.

Column I	Column II
(A) Nuclear fission nuclear forces	(p) Involves weak
(B) Nuclear fusion	(q) Involves conversion of matter into energy
(C) β -decay	(r) Atoms of higher atomic number an used
(D) Exothermic nuclear reaction	(s) Atoms of lower atomic number are used

4.

Column I	Column II
(A) α - decay	(p) ${}_{92}^{235}\text{U} + {}_0^1\text{n} \rightarrow {}_{56}^{141}\text{Ba} + {}_{36}^{92}\text{Kr} + 3({}_0^1\text{n}) + Q$
(B) β - decay	(q) ${}^3_1\text{H} + {}^2_1\text{H} \rightarrow {}^4_2\text{He} + Q$
(C) Nuclear fission	(r) ${}_{88}^{230}\text{Th} \rightarrow {}_{88}^{226}\text{Ra} + {}^4_2\text{He} + Q$
(D) Nuclear fusion	(s) ${}_{55}^{137}\text{Cs} \rightarrow {}_{56}^{137}\text{Ba} + e^- + \bar{\nu} + Q$

5.

Column I	Column II
(A) Coke	(p) Methane
(B) CNG	(q) Candles
(C) Paraffin wax	(r) Gasoline
(D) Petrol	(s) Carbon

ASSERTION & REASON QUESTIONS

Directions: In each of the following questions, a statement of Assertion (A) is given followed by a corresponding statement of Reason (R) just below it. Of the statements, mark the correct answer as

- (a) If both assertion and reason are true and reason is the correct explanation of assertion.
- (b) If both assertion and reason are true but reason is not the correct explanation of assertion.
- (c) If assertion is true but reason is false.
- (d) If assertion is false but reason is true.

1. **Assertion:** Biomass 'is not considered as an effective source of energy.
Reason: Biomass contains large proportions of water as moisture.
2. **Assertion:** Nuclear forces are independent of charges.
Reason: Nuclear force is not a central force.
3. **Assertion:** Binding energy (or mass defect) of hydrogen nucleus is zero.

- Reason:** Hydrogen nucleus contain only one nucleon.
4. **Assertion:** The rest mass energy of a nucleus is smaller than the rest mass energy of its constituent nucleons in Free State.
Reason: Nucleons are bound together in a nucleus.
5. **Assertion:** U^{235} nucleus, by absorbing a slow neutron undergoes nuclear fission with the evolution of a significant quantity of heat.
Reason: During nuclear fission a part of the original mass of U^{235} is lost and gets converted into heat.
6. **Assertion:** Charcoal needs lesser preheating than wood for burning.
Reason: The ignition temperature of charcoal is high.
7. **Assertion:** Aerobic thermal degradation of wood is termed as carbonization.
Reason: Wood under the affect of high temperature and pressure and p the absence of air gets converted in to coal.
8. **Assertion:** Non-renewable sources of energy are also called exhaustible source of energy.
Reason: Non-renewable sources of energy do not get exhausted by norm a human activity.
9. **Assertion:** Gases like carbon dioxide methane, nitrous oxide etc. are called greenhouse gases.
Reason: They are not responsible for the warming of the planet,
10. **Assertion:** Chemical reaction is a kind of nuclear reaction.
Reason: No new atom is formed during the reaction.
11. **Assertion:** Nuclear radiations are harmful because of their high ionization and penetrating powers.
Reason: If nuclear radiation fall on us, the molecules are ionised which disrupts the biochemical process.
12. **Assertion:** Nuclear fusion produce more energy than nuclear fission
Reason: The technical problems of achieving controlled fusion are however very much greater than with fission.
13. **Assertion:** The sun's energy comes from the fusion of hydrogen nuclei in to helium nuclei, which is going on inside it, all the time.
Reason: The nuclear fusion reaction taking place in the sun which releases a tremendous amount of energy is the fusion of 4 hydrogen atom nuclei to form a bigger nucleus of helium atom.
14. **Assertion:** Wind energy is an environment friendly and efficient source of energy.
Reason: Wind energy farms can be established everywhere.
15. **Assertion:** Solar cells are used to convert solar energy in to electrical energy.
Reason: The radiant heat present in solar energy does not change in to electrical energy.