Chapter # 7
Energy

THIS CHAPTER CONSISTS OF

- Work and energy.
- Different forms of energy.
- Inter -conversion of energy.
- Degradation of environment.
- Conservation of energy.
- Measurement of energy
- Energy and environment.
- Nuclear fuel hazards.
- Demand of energy.
- Production of electrical energy.

Q.1. What is the importance of energy in our daily life? (LHR 2019 GI)

Ans. **ENERGY**

The ability of a body to do work is known as energy.

IMPORTANCE OF ENERGY

Energy is the most essential part of our life. Without energy, we cannot perform any of our daily life functions. We use energy in different forms to do many works from dawn till dusk (night). Even during sleep, we need energy. Different forms of energy, which we use daily, are:

There is an incredible amount of energy in big tides of sea. There is positive and negative prospective of this.

(i) CHEMICAL ENERGY

After work, we get tired after working we feel hungry, we take food which provides us energy.

(ii) LIGHT ENERGY

All the food on planet is due to the light, which is another form of energy. Plants prepare their food with the help of light.

(iii) HEAT ENERGY

We require heat to warm ourselves in winter. Heat is yet another form of energy.

(iv) ELECTRICAL ENERGY

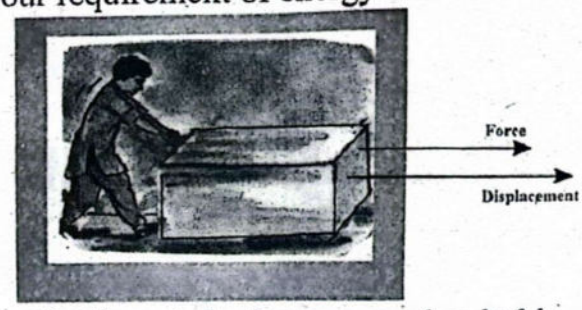
We use fans, refrigerators and air-conditioners for cooling. Besides them, we use many other appliances which work with electricity. Electricity provides them energy to run.

(v) **FUEL ENERGY**

Motorbikes, heavy vehicles, aeroplanes and ships consume fuel, which provides energy. As our usage for machines increases, our requirement of energy also increases.

Q.2. Define work and energy.

Ans. WORK



Work is the product of force and distance in the direction of the force.

i.e., Work = Force x Distance in the direction of the force.

Example: Suppose a person works in an office for the whole day or a worker holds up a wooden box for half an hour. Apparently both of them have performed work, but in the scientific term this would not be considered as work. There is a proper definition of work in Physics. When a force acts on a body and the body is displaced, then the force is said to have done work on the body.

UNIT

The unit of work is joule (J).

ENERGY

The ability of a body to do work is known as energy. Energy is ability to do work.

UNIT

Since the unit of work is joule therefore, the unit for energy is also joule.

Q.3. Describe the different forms of energy.

(LHR 2014 GI, LHR 2015 GI, LHR 2015 GII, FBD 2015 GI)

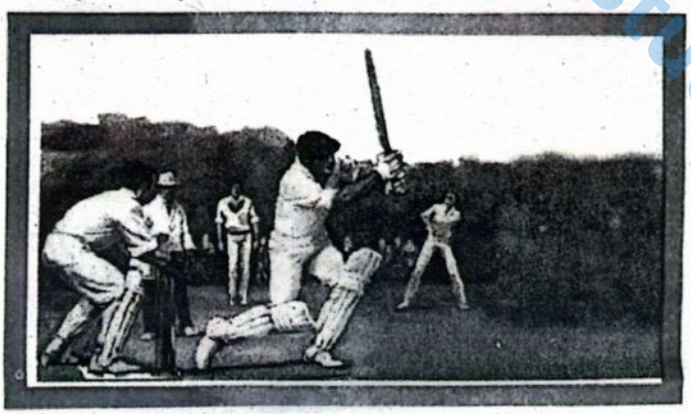
Ans. **Energy is found in many forms.**

Some common forms of energy are as follows:

(i) **KINETIC ENERGY**

DEFINITION

Energy possessed by a body due to its motion is known as kinetic energy.



EXPLANATION

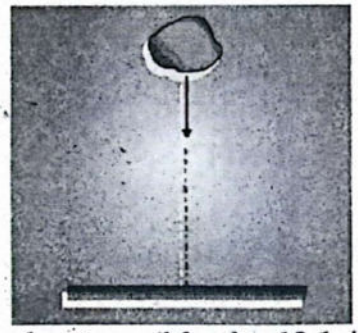
When a body is moving, it possesses energy. Because a force is acting on it and it also covers some distance. It means that the body has the ability to do work.

Example

When a cricket ball is hit with a bat, the ball runs fastly. We say that the running ball possesses kinetic energy. But we observe that ball stops after covering some distance, then where did the kinetic energy go? (Fig). Actually a force acts on the moving ball in opposite direction, which is ground friction. This frictional force causes the ball to stop. Here the friction of air is negligible. The ball has to apply the same amount of force opposite to the frictional force to keep its motion. Thus the ball is doing work against friction, which is the product of its force and the distance covered. All of the kinetic energy of the ball is consumed in doing work and the ball eventually stops. This proves that a body can do work due to kinetic energy.

DEPENDENCE OF KINETIC ENERGY

The kinetic energy of a body depends upon its mass and speed. The more the mass or speed of a body the more is its kinetic energy.



POTENTIAL ENERGY

A stone lying on the ground does not possess the ability to do work. If that stone has to be moved up to a certain height, a force equal to the gravitational force will have to be applied on it. In other words, work has to be done on it. The work done will be stored in the stone as energy and it will gain the ability to do work.

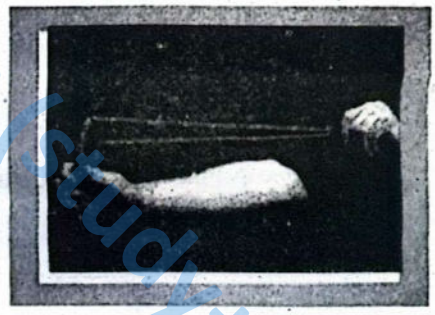
When the stone is released from this height, it will fall to the ground by itself doing work. The energy possessed by the stone at height is the potential energy.

(iii) *ELASTIC* POTENTIAL ENERGY **(LHR 2014 GI)**

On pressing spring the elastic potential energy is stored in it.

EXPLANATION

When a spring is pressed, an elastic potential energy is stored in it. When it is released, it shoots up by itself and possesses the ability to do work. The energy stored in a body by pressing, stretching or twisting it, is known as elastic potential energy. If a piece of rubber or the rubber of a slingshot is stretched an elastic potential energy is stored in it.



(iv) CHEMICAL ENERGY **(LHR 2014 GII)**

Sometimes, energy is emitted during chemical reactions. The source of this energy is the chemical bonds between atoms. When these bonds break, energy is released.

SOURCES

In cells and batteries, chemical energy transforms into electrical energy.

The energy obtained by burning fuel in cars is also chemical energy.

The energy obtained by our bodies by consuming food is also chemical energy.

(v) HEAT ENERGY

Heat is also a form of energy.

DEFINITION

Heat energy is due to the movement of the molecules of bodies. The faster the movement of molecules, the greater is the heat energy.

SOURCES

The Sun is the largest source of heat energy.

Burning of fuel is another source of heat energy.

When current passes through the element of an electric heater or an electric iron, heat is produced.

(vi) LIGHT ENERGY

Light is another form of energy

DEFINITION

When electrons revolving around the nucleus jump from a higher energy orbit to a lower energy orbit, light is emitted. We can see things with the help of light.

SOURCES

The largest source of light is Sun.

When current passes through a bulb, it emits light.

The leaves of plants prepare food by photosynthesis with the help of light.

All creatures on Earth are directly or indirectly dependent upon the food made by plants.

(vii) ELECTRICAL ENERGY **(LHR 2019 GII, LHR 2020 GI)**

DEFINITION

Electrical energy is the energy of moving charges.

IMPORTANCE

Electrical energy is the energy of moving charges. Electrical energy is used on large scale, because it can be easily achieved and transferred from one place to another and can also be transformed into different forms of energy.

SOURCE

We use energy obtained from different sources by converting it into electrical energy.

For this purpose, power stations are built that supply electricity at far off places.

The energy for destruction in the atom bomb is also nuclear energy

(viii) NUCLEAR ENERGY

DEFINITION

Nuclear energy is obtained by breaking the nuclei of heavy atoms. This process is called nuclear fission.

NUCLEAR FISSION

Nuclear fission is done in a nuclear reactor where energy is released in the form of heat. This heat can be used to produce electricity.

NUCLEAR FUSION

Energy is also released when the nuclei of small atoms fuse together. This is known as nuclear fusion. It is also nuclear energy.

For example: The heat and light coming from the Sun are released due to this process.

Q.4. What is meant by inter-conversion of energy? Define law of conservation of energy? (LHR 2016 GI, LHR 2018 GII, BWP 2016 GI, DGK 2016 GII)

Ans. **INTER-CONVERSION OF ENERGY**

Energy is used in our daily life in different forms of heat, light and electricity. Energy changes its form in different conditions.

For Example

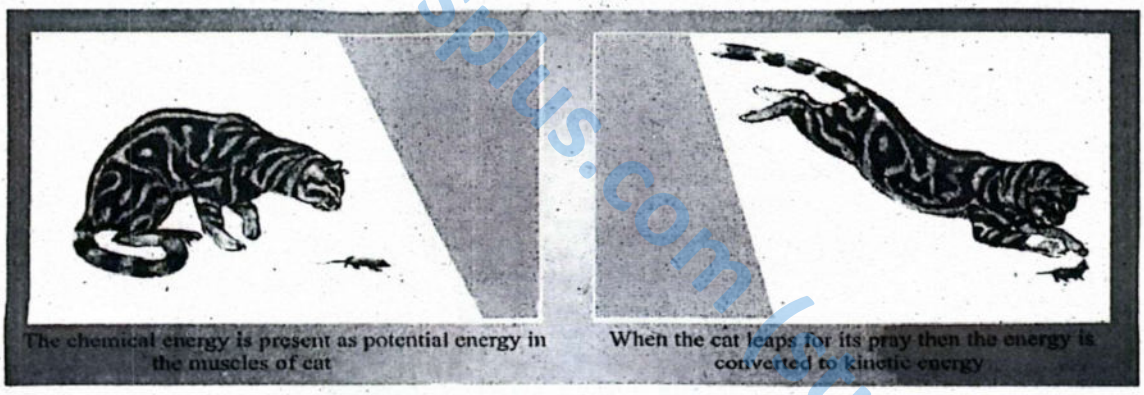
(i) When a body is taken at a height, gravitational potential energy is stored in it. When the body is dropped, the gravitational potential energy converts into kinetic energy.

(ii) The chemical reaction in cells or batteries convert chemical energy into electrical energy. When current passes through a bulb, it emits light and heat. The electrical energy in a bulb is converted into heat and light.

(iii) The food you eat possesses chemical potential energy. Your body has the capability to transform potential energy into heat that maintains your temperature.

The body also converts some chemical energy into kinetic energy of blood and nucleus so that you can live.

Some energy in the body is also converted into electrochemical energy on which your nervous system works.



The chemical energy is present as potential energy in the muscles of cat

When the cat leaps for its pray then the energy is converted to kinetic energy

LAW OF CONSERVATION OF ENERGY

The definition of the law of conservation of energy is as follow:

Energy can neither be created nor destroyed.

In other words, the total energy of an isolated system always remains constant, although it is transformed from one form to an other.

For Example

The chemical energy is present as potential energy but when the cat leaps for its prey then the energy is converted to kinetic energy.

This example proves that one form of energy can be transformed into another form, but the total energy always remains conserved. When we say that energy is consumed, we actually mean that it is changed from one form to the other or it is transformed from one place to the other. In most of the cases, energy is eventually transformed to heat.

Q.5. Explain why the demand of energy is highly increased now as compared to the earlier times i.e. 50 years ago?

Ans. Requirement of energy is manifold increased now a days as compared to earlier times..

(i) In earlier times, there was no electricity in most of the houses. People used to illuminate their houses by candles, lantins or other such things.

(ii) Instead of electric fans, hand held fans were used. There was no concept of things like refrigerator or television. But, with the advancement of science, people got many comforts of life. Today not only cities, but villages also have been provided electricity.

(iii) The increase in consumption of electricity is not confined to houses only, but the dependence of industries on electricity has increased manifolds. Not only large scale factories but small workshops are also using machines.

(iv) The use of electricity in agriculture is also increasing. Earlier, people used to wait for rain or get water from wells, but now tube wells are run by electricity. Many barren lands have been irrigated by this. The yield per acre has increased. In many other fields of life, the consumption of energy is constantly increasing. It is required to discover more resources of energy and the present resources utilized in a better way.

Q.6. What are the conventional or traditional methods of producing electricity?

Ans. **TRADITIONAL METHOD OF PRODUCING ELECTRICITY**

(FBD 2015 GII, MTN 2015 GI, BWP 2015 GI)

The most important use of energy is in the form of electrical energy. We change electrical energy in the form of heat, light and motion according to our need.

The traditional methods to make electricity involves the use of

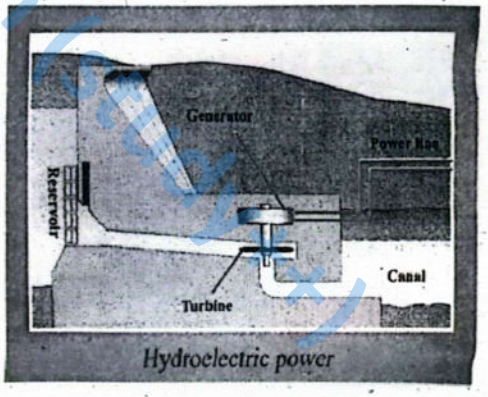
(i) Running water (ii) Burning fuel (iii) Nuclear energy

These congenital or sources of producing electricity are as follows:

(i) HYDROELECTRIC POWER

DEFINITION

The conversion of kinetic energy of running water, to electrical energy is known as hydro-electric power.



Hydroelectric power

METHOD

Water is stored in a high lake or reservoir. At a height, gravitational potential energy is stored in the water. When water falls from height, the potential energy is changed to kinetic energy.

Tunnels are made to bring water from the reservoir to a lower place. The kinetic energy of running water turns the turbines which in turn runs the electric generators. By this method electricity is produced.

ADVANTAGE

(i) *There is no* heat, smoke or gas pollution in this method.

(ii) Water from the power station is used for agriculture purposes.

(ii) THERMAL POWER (LHR 2014 GII, LHR 2017 GII)

DEFINITION

Coal, oil and natural gas are burnt to obtain thermal power.

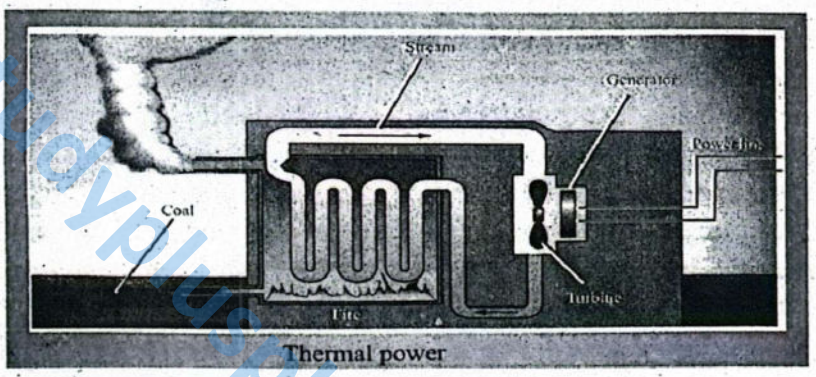
These fuels are known as fossil fuels. The remaining of plants and animals buried for millions of years under the Earth are changed into fossil fuels.

IMITATIONS

These fuels are in a limited quantity. It will take millions of years to form new fuels once the old ones are exhausted.

METHOD

The chemical potential energy is stored in fossil fuels. The burning of these fuels gives out heat which is used to generate steam that turns the turbines to produce electricity.



Thermal power

DISADVANTAGES

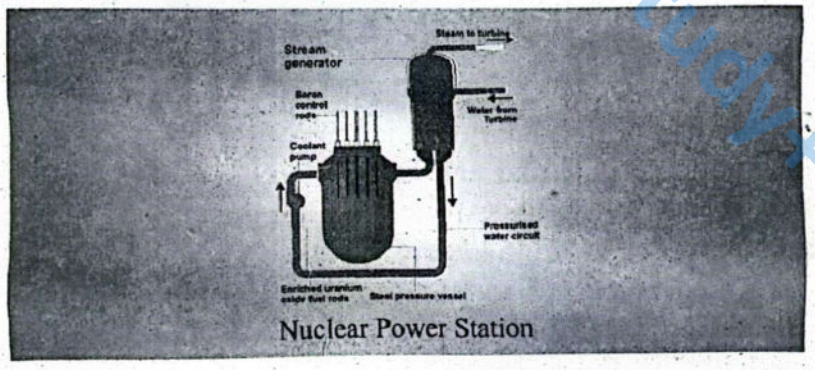
(i) Burning of fuel produces smoke, which is the main cause of pollution.

(ii) It is an expansive method.

(iii) Production of heat during burning also increases the problem of global warming.

(iii) NUCLEAR POWER

Many developing and dveloped countries generate electricity by nuclear energy. In Pakistan, there are nuclear power stations which are built at Karachi and Chashma.



Nuclear Power Station

METHOD

The source of nuclear Power is the nucleus of an atom in which energy is stored. When the nucleus of a heavy atom is broken, a large amount of energy in the form of heat is released. This process is known as nuclear fission. Uranium-235 or Plutonium is

used as fuel in nuclear fission.

FUEL

Uranium-235 or Plutonium is used as fuel in nuclear fission.

NUCLEAR REACTOR

The whole process of nuclear fission is used to change water to steam, which in turn runs the electric generators to produce electricity.

Q.7. Describe any four non-conventional or non-traditional methods of producing electricity. (LHR 2014 GI, LHR 2017 GI, RWP 2015 GI, DGK 2015 GI)

Ans. The resources are not sufficient to cope with the increasing demand of electricity. We have to find new resources. The new resources are used for the production of electricity through non-conventional methods.

NON-TRADDITIONAL METHODS OF PRODUCING ELECTRICITY

We should take all possible steps to promote new methods so that we may have sufficient and cheap resources to fulfil our needs.

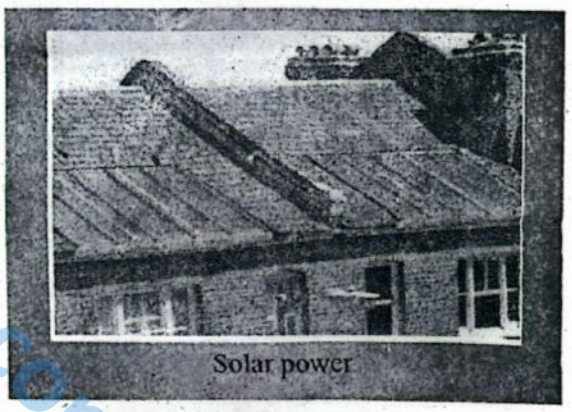
Some of the non-traditional methods of producing electricity are given below:

1. SOLAR POWER

DEFINITION

Solar energy is the energy obtained from the Sun:

Usually, the solar energy falling on the atmosphere of Earth is almost 1.4 kilowatt per square metre. The dust particles, water vapours and gases present in the atmosphere absorb, reflect or disperse most of the energy. But still about 1 kilowatt of energy per square metre reaches the Earth's surface.



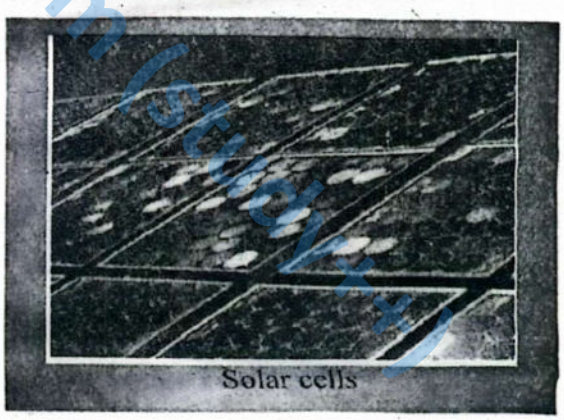
Solar power

METHODS

Solar energy is used in two ways.

(i) SOLAR PANELS

The solar panels absorb heat. These consist of large plates that have been painted black. The absorbed heat is used to heat houses or run water turbines of generators and produce electricity.



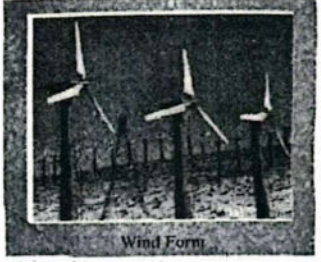
Solar cells

(ii) SOLAR CELLS

Sunlight is directly transformed to electricity with the help of solar cells. The voltage of one cell is very small but for practical usage we can connect many cells in series to get large voltage.

At present this method is expensive but it is hoped to get it cheaper in future.

2. WIND POWER


Wind Farm

DEFINITION

In wind power, kinetic energy of fast blowing air is used to produce electricity.

(i) METHOD

A windmill consists of three or four wings mounted on top of a pole. These are called turbines of wind mill. When turbines turn due to air, we can make use of this energy in many ways. Traditional wind mill is used to grind grains and to fetch water from the well. But the modern wind mill is used to run generators that produce electricity.

(ii) WIND FARM

A big form of many wind mills is made to produce electricity. This is capable of running huge generators. It is called wind farm.

3. TIDAL POWER (LHR 2016 GI)

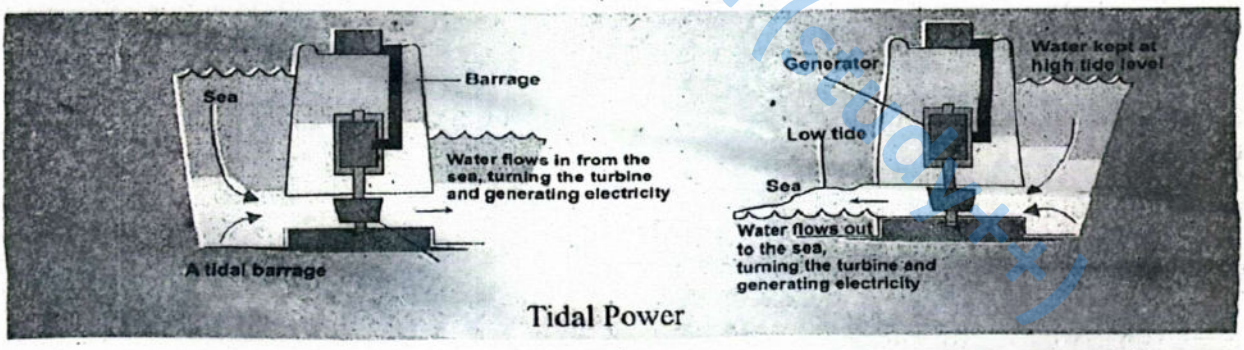

Tidal Power

DEFINITION

Big tides of water are generated in the see due to attraction of moon. The energy of these tides is known as tidal energy. The tidal energy can be used to produce electricity.

METHOD

A dam is constructed for this. At the arrival of high tide, water is trapped in the dam. On return o f tide, trapped water is allowed to flow out in such a way that it turns the turbine. The generator joined to the turbine produces electricity. The high tide moving towards the dam is also used to turn the turbine.

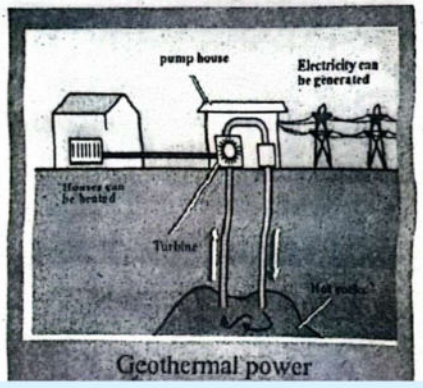


Tidal Power

4. GEO THERMAL POWER

DEFINITION

The make use of energy deep under the Earth in the form of hot water or steam is known as geothermal power.

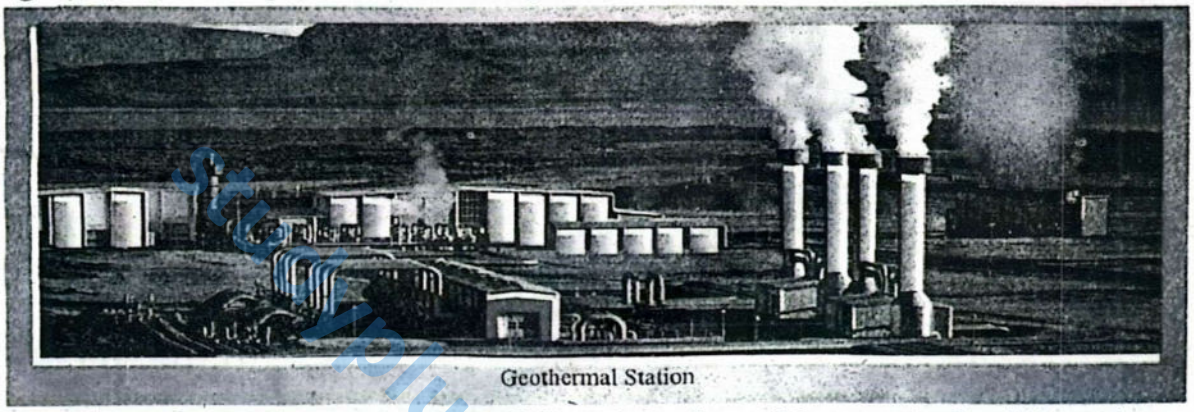


Geothermal power

METHOD

About 10 km below the surface of Earth, there are hot semi-molten rocks at some places. The temperature of these rocks is 200°C or above. Where there is water present over such rocks, it comes out to the surface of Earth in the form of fountains, geysers and steam. The steam is used to run generators.

Where there is no water over the rocks and also the rocks are not so deep, two tunnels are drilled there up to the rocks. Cold water is pumped through one tunnel, which comes out in the form of steam through the second tunnel. The steam runs the generator, which produces electricity.



Geothermal Station

Q.8. Write a note on the production of electricity from Biomass and solid wastes.

Ans. ELECTRICITY PRODUCTION FROM BIOMASS (SGD 2015 GI)

BIOMASS

Biomass consists of all organic materials such as residue of crops, trees, plants, vegetable peels, animal dung and sewage etc. Sewage is that dirt which is remained after straining dirty water.

FUEL BY BIOMASS

The fuel obtained by biomass is of two types.

(i) Ethanol (alcohol) is produced by the alcoholic fermentation of biomass; this is a substitute of gasoline.

(ii) Methane gas is also produced in another type of fermentation. Methane is the natural gas. This is called biogas.

METHOD OF PRODUCING BIOMASS

The method of producing

(iii) Another type of fermentation gives out methane gas, which is the substitute of natural gas. This is called biogas. It can be burnt or used to produce electricity.

METHOD

The method of producing biogas from biomass is not complicated. Biomass is rotted *in a closed tank* or a pit. Bacteria helps to ferment ate it and biogas is the output that can be piped out easily. The residue left over in the pit is a good fertilizer

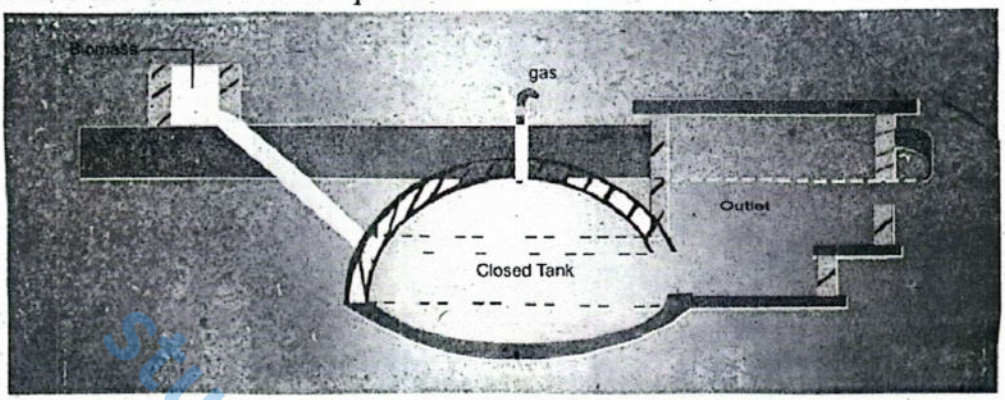
ELECTRICITY PRODUCTION FROM SOLID WASTES

***SOLID* WASTES**

Solid waste is the dry garbage that is collected by the municipality.

METHOD

Solid waste is burnt in a type of furnace. The heat thus produced is directly supplied to the boiler, which converts water into steam. The generators are run with this steam to produce electricity. This also solves the problem of solid waste disposal, but it increases the environmental pollution.



Q.9. What are the units of work and energy? In what unit is the electrical energy measured? Also describe the principal working of electricity meter.

Ans. **UNITS OF WORK & ENERGY** **(LHR 2016 GI)**

Since energy is the ability to do work, therefore the unit of energy will be the same as that of work. The SI unit of work and energy is joule (J). This very unit is used for all kinds of energy.

MEASURING ELECTRICAL ENERGY

Electrical energy can also b e measured in joules. But practically kilowatt-hour unit is used for its measurement. The meters installed in our homes measure electricity in this unit. The number of units consumed by an electric appliance depends upon its power as well as the duration for which it is kept on.

POWER

The energy consumed in cone second is called power.

Power = Energy / Time

UNIT

The unit of power is watt. The symbol used for this is W.

One thousand watt power is called as one kilowatt. You might have read 60W, 100W etc. printed over bulbs. This is the power of bulb.

UNIT OF ELECTRICAL ENERGY

The unit of electrical energy is kilowatt-hour (kWh). The electricity meters measure electricity in this unit.

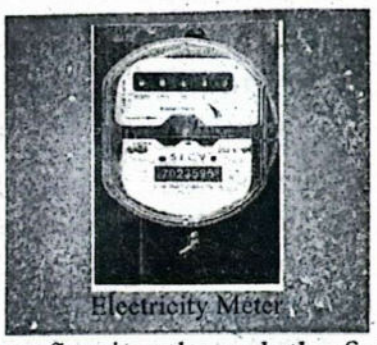
One kilowatt-hour is the amount of energy that is consumed by a 1000 watt appliance in one hour.

For Examples:

(i) A 100W bulb consumes one unit of electricity in 10 hours and (ii) 200W bulb consumes in 5 hours. (iii) An air conditioner of 2500W consumes 2.5 units of electricity in one hour.

WORKING OF ELECTRICITY METER:

To understand the working of an electricity meter, we must learn its structure. Structure of an electricity meter.


Electricity Meter

LIVE WIRE

Live wire of main supply passes through the field coils of the meter. At the center of field coils there is another coil, which can rotate about its axis. This coil is connected to the main supply through a high resistance.

WORKING

When an appliance in the home is turned on, current starts flowing through the field coils. This produces a magnetic field due to which the coil inside the field rotates. The disc rotating along with coil can be seen from outside.

READING

The larger the current flowing through the meter, the faster is the rotation of disc. The gears attached to the disc display meter reading on the dial in the form of 1 digits. Usually the digit to the extreme right $1/10^{th}$ of the unit i.e., decimal point, while the 10 reading to its left shows the number of units in kilowatt-hours.

Q.10. Describe the principal working of natural gas meter.

Ans. **MEASURING NATURAL GAS (LHR 2108 GI, LHR 2019 GI, GUJ 2015 GI)**

UNIT OF NATURAL GAS

Natural gas is measured in cubic metres.

WORKING

The gas turns a wheel while passing through its way. The gears attached to the wheel display the volume of gas on the dial.


Gas Meter

BRITISH UNIT OF MEASURING

Although petrol, diesel and natural gas are measured in units of volume, but these fuels can also be measured in units of energy. For this, we should know the amount of heat produced in joules by a specific amount of fuel.

BRITISH THERMAL UNIT

These days, gas bills are being charged on the base of Btu instead of cubic metres. The Btu is a unit of energy called the British Thermal Unit. One Btu is equal to 1055 joules.

Q.11. Differentiate between environment and atmosphere. Describe the importance of atmosphere. (MTN 2015 GI)

Ans. **ENVIRONMENT**

The living place of people and all physical and social factors around that affect their living and working conditions is called the environment. Air, water and land are the inanimate components of environment. Air is the main component of Earth

environment. In the absence of air, no life could have been possible on Earth.

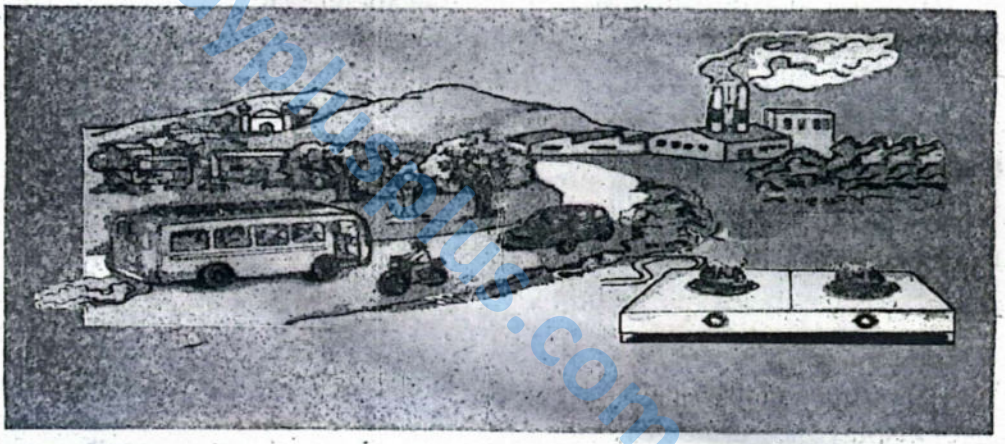
ATMOSPHERE

Air is present up to the height of about 200 kilometres from the surface of Earth. It is called atmosphere. That part of atmosphere where all living bodies reside is 8 to 20 kilometres thick cover of gases over the earth. This cover acts as a shield against heat. Without this, the Earth would scorch with heat in the day and its temperature would fall to below $0^{o}C$ in the night.

Q.12. What is thermal pollution? How is it produced? How does it affect the environment? (LHR 2019 GII, SGD 2016 GII, MTN 2016 GII, DGK 2016 GI)

Ans. The unpleasant change occurring in air, water and surface of Earth that causes unhygienic effects on the human and animal life as well as on the plants is called pollution. The Pollution caused is of many types, but we will discuss here the thermal pollution only.

The pollution caused in the environment by heat, smoke harmful gases is called as thermal pollution.



EFFECT OF THERMAL POLLUTION

Although heat is very essential for plants, animals and human life, but if the proportion of heat in the environment exceeds a certain limit, it could be harmful. The excessive use of energy has increased the thermal pollution in our environment.

FACTORS INCREASING THE THERMAL POLLUTION

There are many factors that cause thermal pollution.

(i) BURNING OF FOSSIL FUELS

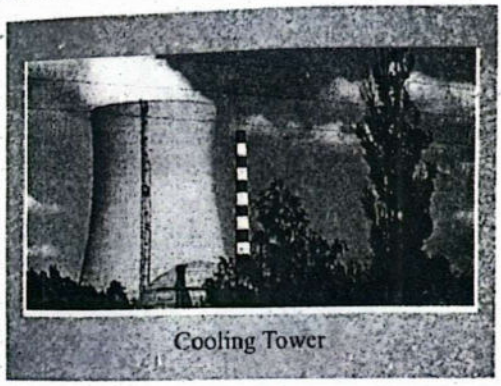
Carbon dioxide, carbon monoxide, sulpher dioxide, lead compounds and other harmful gases in addition to tremendous amount of heat are added in the atmosphere by the burning of fossil fuels. Fossil fuels are burnt in transport, in industries, for the production o f thermal power and for many other purposes.

(ii) NUCLEAR ENERGY

The nuclear energy used for producing electricity is also a cause of addition in the thermal pollution. The cooling towers of nuclear reactors are adding heat into the atmosphere all the time. Other than this, all the forms of energy that we use are

(iii) **INCREASED CARBON DIOXIDE PRODUCTION**

A big cause of increase in thermal pollution is the greenhouse effect. Carbon dioxide acts like glass of greenhouse. When the Earth after absorbing Sun heat, emits heat rays of larger wavelengths, carbon dioxide does not allow them to escape out into space but instead absorbs them. Therefore the increase of carbon dioxide gas in the atmosphere causes increase in temperature at the surface of Earth. As the thermal pollution is increasing, the temperature of Earth's environment is also increasing.



Cooling Tower

Q.13. What do you meant by degradation of environment? How can we minimize it? Give steps to minimize degradation of environment.

Ans. **DEGRADATION OF ENVIRONMENT** **(LHR 2015 GII, LHR 2018 GII, DGK 2019 GI)**

The following steps can be useful to minimize thermal pollution.

(i) The main role to minimize thermal pollution is played by forests. Plants absorb carbon dioxide from the atmosphere and emit oxygen. This helps to maintain balance of environment. But the growing population has started deforestation for their energy needs. This is depriving human beings of great blessing of God. It is needed that forestation be increased so that balance of environment may not be shattered.

(ii) The fitness of vehicles running on roads should be observed. Vehicles should not make smoke. Rickshaws particularly motorcycle rickshaws are producing too much pollution in cities.

A better system of public transport can reduce pollution to much extent. If comfortable buses are available easily for public transport in cities, many people will stop driving their own cars and motorcycles. This will reduce pollution as well as save national money. Pollution will be minimized to much extent, if the trains has to run with electricity instead of fossil fuels. Electric trains network should be promoted in our country.

(iii) Industries consume almost 20% of energy resources. In addition to heat, poisonous gases emitted by them also cause pollution. Appropriate processing is needed for this.

(iv) Such energy sources should be promoted, which produce less pollution e.g., electric energy, solar energy, wind energy, tidal energy.

(v) Excessive growth in population is also one reason o f enhancement in pollution. As population increases, the need for energy also increases with the same ratio. Consumption of more energy means more increase in pollution. It suggests that population planning is very important.

(vi) People should be careful to burn solid waste and tyres etc. at public places.

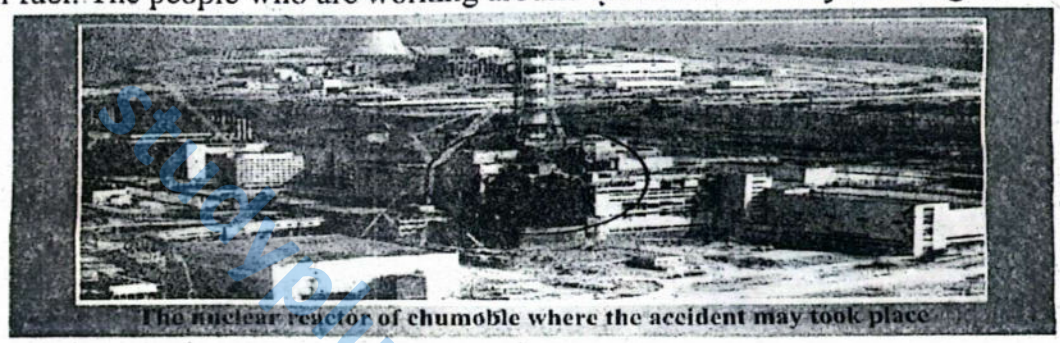
Q.14. What are nuclear fuel hazards? What are their effects?

Ans. NUCLEAR FUEL HAZARDS (LHR 2018 GI, FBD 2015 GI, RWP 2016 GI)

The use of nuclear energy for production of electricity in advanced countries is increasing day by day. The possibility of leakage of the radiation during use of nuclear energy cannot be denied.

RADIATION

Radiation means the emission o f alpha (α), beta (β) and gamma (γ) rays from some elements called the radioactive elements. The fuel of nuclear reactors is radioactive. The danger of radiation leakage is always there while storing, handling and using such fuel. The people who are working around reactors are always in danger.



The nuclear reactor of chumoble where the accident may took place

EFFECT OF RADIATIONS

Radiation has the capability to change the structure of cells, tissues and genes of *living* bodies by their impact with them. This can cause skin diseases and cancer. Even a small accident in a nuclear reactor could be very disastrous.

INCIDENT OFCHERNOBYL

In 1986, the cooling system of a reactor in Churnoble (Russia) failed, due to which roof of the reactor blew up with a blast in a few minutes and radioactive gas clouds spread all over the area. Hundreds of people were killed in that accident. Later on many of the people died after suffering from cancer.

RADIATIONS FROM NUCLEAR WASTES

The used nuclear fuel does also emit some radiation. That is called nuclear waste. The disposal of nuclear waste is very necessary for safety against radiation.

METHODS OF NUCLEAR WASTE DISPOSAL

Different ways are adopted for this purpose. These methods include

(a) Dumping of nuclear waste in the tunnels deep under the Earth store.

(b) Store nuclear waste in sealed containers at the bottom of the sea.

SUGGESTION FOR SAFE DISPOSAL OF NUCLEAR WASTES:

(i) Such material be stored after fusing it into glass blocks.

(ii) Nuclear waste be filled in rockets and sent t o the space or other planets or sent towards the Sun. But it is feared that rockets may not explode in the Earth's atmosphere or they may not come back to the Earth.

PROTECTION FROM RADIATION

For protection from dangers of radiation, it is necessary that:

(a) The workers should keep themselves away from the radioactive source.

(b) Radioactive sources should be kept in lead containers of thick walls, because lead does not allow radiation to pass through it.

(c) Thick concrete walls should be built around nuclear reactors and the nuclear waste should be disposed off very safely.

Q.15. Why does the conservation of energy is necessary ? How can we conserve it? Explain steps to conserve energy. (LHR 2015 GI, LHR 2019 GII, LHR 2017 GI)

Ans. CONSERVATION OF ENERGY

The use of energy in factories, transport, offices, educational institutions and homes is so large that fuel reserves such as coal, oil and gas are exhausting very rapidly. Non- conventional resources of energy are still out of research and development stage. Although efforts are made to use existing resources in a better way, but all these resources are limited. In these circumstances, it is our national duty to conserve energy.

METHODS OF CONSERVATION OF ENERGY OR STEPS TO CONSERVE ENERGY

We can save much energy by acting upon the following suggestions:

(i) Substitute fuels should be used for transport. Many people are running their vehicles on CNG. Alcohol could be a good substitute fuel. Brazil has practiced it very successfully. Most of the vehicles run there with alcohol.

(ii) Use public transport rather than driving their own vehicles. In this way many people can go to work in one big bus instead of going in many individual vehicles.

(iii) **LESS FUEL CONSUMPTION:** The bodies of the vehicles should be made light so that they may consume less fuel.

(iv) **BETTER ENGINES:** The engines with more efficiency should be designed for vehicles.

(v) **HEAT CONSERVATION :** A large amount of energy is wasted in the industries as heat. This heat can be used for different purposes.

(vi) **REUSE OF WASTE FOR BURNING:** The need of energy in some industries can be fulfilled by burning different waste materials.

(vii) **WISE USE OF ENERGY:** We should be careful about unnecessary use of energy in offices schools and homes. Energy savers should be used for light. We can use such electric appliances that consume less energy.

(viii) **LESSER USE OF VEHICLES:** We should develop the habit of walking for small distances.

(ix) **USE OF BIOGAS:** Biogas energy can be made available easily in villages free of any cost. Villagers should be instigated to make use of biogas.

(x) **USE OF HYDAL-POWER:** The small hydal-power stations should be constructed to fulfill the local needs of electricity method.

(xi) **USE OF NON-CONVENTIONAL:** The use of non-conventional energy sources like solar energy, wind energy and tidal energy should be made practicable.

Important Key Points

1. What is work mathematically equal to?

Ans. Work is the product of force and distance in the direction of force.

2. Define energy.

Ans. Energy is the ability to do work.

3. Define kinetic energy.

Ans. Energy possessed by a body due to its motion is known as kinetic energy.

4. Define potential energy.

Ans. Energy possessed by a body due to its position is known as potential energy.

5. Define elastic potential energy.

Ans. The energy stored in a body by pressing, stretching or twisting is known as elastic energy.

6. What is chemical energy called?

Ans. The energy which is emitted during the chemical reactions is called chemical energy.

7. Define thermal energy.

Ans. Energy of a body due to the movement of the molecules is called heat energy.

8. What is called light energy?

Ans. When the electrons revolving around the nucleus jump from a higher energy orbit to a lower energy orbit, light is emitted.

9. What is electrical energy?

Ans. Electrical energy is the energy of moving charges.

10. Nuclear fashion What is it called?

Ans. Energy is obtained by breaking the nuclei of heavy atoms. This process is called nuclear fission.

11. What is nuclear energy called?

Ans. The energy obtained in the process of nuclear fission is called nuclear energy.

12. What is the law of conservation of energy?

Ans. Conservation law of energy states that energy can neither be created nor destroyed.

13. What is hydroelectric power?

Ans. The conversion o f the kinetic energy of running water to electrical energy is known as hydro-electric power.

14. What is thermal power?

Ans. The production of electricity of burning coal, natural gas and oil is called thermal power.

15. What is nuclear power?

Ans. The production of electricity through the nuclear fission process is called nuclear power.

16. What is solar power?

Ans. The production of electricity from solar energy is called solar power.

17. What is wind power?

Ans. The production of electricity due to the kinetic energy of fast blowing air is called wind power.

18. What is tidal energy?

Ans. Tidal energy is the energy due to the tides of water. The production of electricity from tidal energy is called tidal power.

19. What is geothermal power?

Ans. To make use of energy deep under the Earth in the form of hot water or steam is known as geothermal power.

20. What is biomass?

Ans. Organic materials and their residues are called biomass.

21. What is thermal pollution?

Ans. The pollution caused in the environment by heat, smoke and harmful gases is called thermal pollution.

22. What is meant by environmental disturbance?

Ans. When pollution more than a certain limit is added into an environment, it is known as degradation of the environment.

23. What is nuclear waste?

Ans. The residue of the used nuclear fuel is called nuclear waste.

Glossary

Work:	Product of force and distance.
Energy:	Ability to do work.
Kinetic Energy:	Energy due to motion.
Potential Energy:	Energy due to position.
Elastic Potential Energy:	Energy stored due to pressing, stretching and twisting.
Chemical Energy:	Energy produced due to chemical reaction.
Heat Energy:	Energy due to molecular motion.
Light Energy:	Energy due to which we see things.
Electrical Energy:	Energy of moving charges.
Nuclear Energy:	Energy from the nucleus of atom.
Hydroelectric Power:	Production of electricity from flowing water.
Thermal Power:	Production of electricity from burning fossil fuels.
Nuclear Power:	Production of electricity from nuclear energy.
Solar Power:	Production of electricity from solar energy.
Wind Power:	Production of electricity from wind energy.
Tidal Power:	Production of electricity from force of water tides.
Geothermal Power:	Production of electricity by steam or hot water coming from depth of Earth.
Biomass:	Organic materials and their residues.
Solid Waste:	Garbage.
Biogas:	Gas produced by biomass.
Kilowatt-hour:	Unit of electrical energy.
Environment:	Living place of people including physical and social factors around them.

Thermal Pollution: Addition of heat and harmful gases in the atmosphere.

Greenhouse Effect: Increase in temperature of environment due to carbon dioxide gas.

Degradation of Environment: Addition of pollution in environment more than a certain limit.

Nuclear Fuel: Materials, from where nuclear energy is obtained.

Radiation: Alpha, beta and gamma rays.

Exercise

Q. 1 Select the correct answer for the following statements:

(i) The unit of energy is

(a) Newton (b) metre
(c) joule (d) second.

(ii) The energy due to motion is called

(a) potential energy (b) kinetic energy
(c) nuclear energy (d) chemical energy.

(iii) The method of production of electricity that does not produce pollution is

(a) hydroelectric power (b) thermal power
(c) nuclear power (d) burning of biogas.

(iv) By burning fossil fuels we get

(a) solar power (b) tidal power
(c) nuclear power (d) thermal power

(v) We can save energy

(a) by increasing personal vehicles (b) by making vehicles of heavier bodies
(c) by not walking (d) by avoiding unnecessary use of energy.

Answers

(i)	(c)	(ii)	(b)	(iii)	(a)	(iv)	(d)	(v)	(d)

Q. 2 Fill in the blanks:

(i) Work is the product of force and distance described in the direction of _____.

(ii) We can see things with the help of _____.

(iii) Photocells convert light into _____.

(iv) The energy of the sea tides is called _____energy.

(v) The safe disposal of _____is very necessary to protect from radiation.

Answers

(i)	Force	(ii)	Light	(iii)	Electricity	(iv)	Tidal	(v)	Nuclear waste

Q. 3 Mark (✓) against true and (X) against false statement:

(i)	The energy possessed by a body due to position is called kinetic energy.	×
(ii)	Electrical energy is the energy of flowing charges.	✓
(iii)	Chemical potential energy is stored in fossil fuels.	
(iv)	Cooling towers of nuclear reactors absorb heat from the atmosphere.	×
(v)	When pollution less than a certain limit is added to the environment, it is known as degradation of environment.	×

Q. 4 Give short answers to the following questions:

(i) What is the law of conservation of energy?

Ans. The law of conservation of energy states that: "Energy can neither be created nor destroyed".

(ii) Define the unit of electrical energy.

Ans. The unit of electrical energy is joule. It is represented by the symbol "J".

(iii) Define environment.

Ans. The living place or habitat of people and all the physical and social factors around that affect their living and working conditions, is called the environment.

(iv) What is meant by degradation of environment?

Ans. When pollution is added to the environment more than a certain limit, it is called degradation of the environment, which affects the health of living bodies and damages the plants.

(v) Write down the names of three conventional methods and five non-conventional methods of producing electricity.

Ans. **Conventional methods of producing electricity:**

Traditional or conventional methods of producing electricity are:

i. Hydroelectric Power
ii. Thermal Power
iii. Nuclear Power

Non-conventional methods of producing electricity:

Some of the non-traditional or non-conventional methods of producing electricity are:

a. Solar Power
b. Wind Power
c. Tidal Power
d. Geothermal Power
e. Electricity production from Biomass and Solid wastes.

(vi) Give any three suggestions for the conservation of energy.

Ans. Suggestions for the conservation of energy.

i. **Heat conservation:** A large amount of energy is wasted in the industries as heat. This heat can be used for different purposes.

ii. **Use of Public Transport:** People should use public transport rather than driving their own vehicles.

iii. **Use of biogas:** Biogas energy can be made available in villages free of any cost. Villages should be provoked to make use of biogas.

(vii) Point out two suggestions for the safe disposal of nuclear waste.

Ans. Suggestions for the safe disposal of nuclear wastes are:

i. Nuclear waste can be dumped in the tunnels deep under the Earth.

ii. Nuclear waste can be stored in sealed container at the bottom of the sea.

Q. 5 Define energy. What is the difference between kinetic and potential energy? Explain with the help of examples.

Ans. Energy

The ability of a body to do work is called energy.

Kinetic Energy	Potential Energy
Energy possessed by a body due to its motion is known as kinetic energy.	Energy possessed by a body due to its position is known as potential energy.
For Example:	**For Example:**
When a ball is hit with a stick, the ball runs fastly. We say that the running ball possesses kinetic energy.	If a stone is released from a certain height, it will fall to the ground by itself doing work. The energy possessed by the stone at height is the potential energy.

Q. 6 Describe different forms of energy.

Ans. See Q. No. 3

Q. 7 What is meant by interconversion of energy? Define law of conservation of energy.

Ans. See Q. No. 4

Q. 8. What are the conventional methods of producing electricity? Write a detailed note on any one of them.

Ans. See Q. No. 6

9. Describe any three non-conventional methods of producing electricity.

Ans. See Q. No. 7

10. In what unit is the electrical energy measured? Describe the principle and *working* of electricity meter.

Ans. See Q. No. 9

11. What is thermal pollution? How is it produced? How does it affect the environment?

Ans. See Q. No. 12

12. Write notes on the following:

(i) Nuclear fuel hazards (ii) Conservation of energy.

Ans. See Q. No. 14,15

◘ IMPORTANT MULTIPLE CHOICE QUESTIONS (MCQ's)

Each question has four options. Encircle the correct answer.

1. The unit of power is: (LHR 2014 GI)

(a) Watt (b) Ampere

(c) Coulomb (d) Joule

2. *The fuel obtained* by biomass is: (LHR 2014 GI)

(a) Two types (b) Three types

(c) Four types (d) Five types

3. Emission of radiations from nucleus is said to be: (LHR 2014 GI)

(a) Chemical reaction (b) Atomic reaction

(c) Radioactivity (d) Nuclear fission

When a ball is thrown upward then its kinetic energy changes into what type of energy? **(LHR 2014 GII)**

(a) Heat energy (b) Light energy
(c) Potential energy (d) Tidal energy

The types of radioactive radiations are: **(LHR 2014 GII)**

(a) Two (b) Three
(c) Four (d) Five

The unit of work is: **(LHR 2014 GII)**

(a) Meter (b) Newton
(c) Joule (d) Joule per second

The unit of power is: **(LHR 2014 GII)**

(a) Watt (b) Joule
(c) Ohm (d) Pound

The potential of neutral wire is: **(LHR 2015 GI)**

(a) 50 Volt (b) 100 Volt
(c) 220 Volt (d) Zero

The unit of electrical energy is: **(LHR 2015 GI)**

(a) Newton (b) Volt
(c) Ampere (d) Kilowatt hour

The chemical potential energy is stored in:

(a) Electricity (b) Solar pennel
(c) Rocks (d) Fossils fuel

***Energy* is a _____ part of life.** **(LHR 2015 GI)**

(a) Essential (b) Non-essential
(c) Suitable (d) Non-suitable

The energy due to motion of a body is: **(LHR 2015 GII)**

(a) Electrical Energy (b) Potential Energy
(c) Kinetic Energy (d) Elastic Energy

The energy due to position of a body is called: **(LHR 2015 GII)**

(a) Kinetic Energy (b) Potential Energy
(c) Elastic Energy (d) Energy

The approximate height of Windmill is: **(LHR 2015 GII)**

(a) 80 Feet (b) 90 Feet
(c) 100 Feet (d) 110 Feet

The residues of used nuclear fuel are called as: **(LHR 2016 GI)**

(a) Fossil fuels (b) Nuclear waste
(c) Biomass (d) Solid waste

The S.I unit of potential difference is: **(LHR 2016 GI)**

(a) Ampere (b) Volt
(c) Kilowatt hour (d) Watt

The *product* of force and distance covered in the direction of force is called as:

(a) Work (b) Energy **(LHR 2016 GI)**

(c) Power (d) Heat

18. Energy due to which we see things is:
(a) Elastic potential energy (b) Chemical energy
(c) Electrical energy (d) Light energy **(LHR 2016 GI)**

19. The energy of ocean tides is called as:
(a) Geothermal energy (b) Tidal energy
(c) Wind energy (d) Solar energy **(LHR 2016 GII)**

20. By burning fossil fuels, we get:
(a) Solar power (b) Tidal power
(c) Nuclear power (d) Thermal power **(LHR 2016 GII)**

21. The kinetic energy of running water turns:
(a) Solar cells (b) Windmill
(c) Turbine (d) Nuclear reactor

22. The SI unit of work and energy is:
(a) Force (b) Newton
(c) Joule (d) Kilo joule **(LHR 2017 GI)**

23. The device for measuring current name is:
(a) Volt meter (b) Galvanometer
(c) Ammeter (d) Ohm meter

24. Power is equal to:
(a) Time/Energy (b) Energy/Time
(c) Energy/Distance (d) Time/Distance

25. The method of production of electricity that does not produce pollution:
(a) Hydroelectrical power (b) Thermal power **(LHR 2017 GI)**
(c) Nuclear power (d) Burning of biogas

26. Organisms, used to fermentate the biomass to form biogas are:
(a) Fungi (b) Bacteria
(c) Protozoa (d) All of them **(LHR 2017 GII)**

27. The unit of current is:
(a) Watt (b) Second
(c) Ohm (d) Ampere **(LHR 2017 GII)**

28. One British thermal unit is equal to:
(a) 1055 joule (b) 1050 joule
(c) 1060 joule (d) 1065 joule **(LHR 2017 GII)**

29. One kilowatt is equal to:
(a) 100 watt (b) 1000 watt
(c) 10000 watt (d) 200 watt

30. Burning of fossil fuel adds which of the following gas?
(a) Carbon monoxide (b) Lead compounds
(c) Sulphur dioxide (d) All of them **(LHR 2018 GII)**

31. The constant in Ohm's law is:
(a) Charge (b) Resistance

(c) Current (d) Voltage

Traditional method of producing electricity is: **(LHR 2019 GI)**

(a) Solar power (b) Wind power
(c) Thermal power (d) Tidal power

S.I unit of energy is: **(LHR 2019 GI)**

(a) Watt (b) Meter
(c) Joule (d) Second

Emission of alpha, beta and gamma rays from some material is called:

(a) Condensation (b) Repulsion
(c) Radiation (d) Convection

It is obtained by burning fossil fuels: **(LHR 2019 GII)**

(a) Solar power (b) Tidal power
(c) Nuclear power (d) Thermal power

The energy consumed in one second is called: **(LHR 2019 GII)**

(a) Power (b) Environment
(c) Solar energy (d) Thermal energy

Nuclear energy is obtained by breaking the nucleic of:

(a) Rare gases (b) Heavy atoms
(c) Heavy molecules (d) All of the above

Major source of light is:

(a) Sun (b) Moon
(c) Stars (d) Plants

The ability to do work is called:

(a) Power (b) Force
(c) Energy (d) All of them

Production of electricity with the help of high tides is called: **(LHR 2018 GII)**

(a) Tidal Power (b) Thermal Power
(c) Wind Power (d) Geothermal Power

Cause of air pollution is:

(a) Carbon monoxide (b) Sulphur dioxide
(c) Nitrogen oxide (d) All of them

Energy resources consumed by industries is approximately: **(LHR 2019 GII)**

(a) 10 % (b) 20 %
(c) 30 % (d) 50 %

Energy of moving charges is called:

(a) Heat energy (b) Light energy
(c) Electrical energy (d) Kinetic energy

Product of force and distance is called: **(LHR 2020 GII)**

(a) Work (b) Energy
(c) Both a and b (d) None of them

45. The type of energy, which can be made available easily in villages free of cost, is:
(a) Geothermal power (b) Biogas energy
(c) Hydroelectric power (d) Tidal power

46. Excessive growth in population is also one reason of enhancement in:
(a) Pollution (b) Radiation
(c) Conduction (d) none of them

47. Energy can neither be created nor be:
(a) Changed (b) Altered
(c) Generated (d) Destroyed

48. Electrical energy is the energy of moving:
(a) Waves (b) Vibrations
(c) Charges (d) None of them

49. Chemical, which is used as fuel in nuclear fission, is:
(a) Uranium 235 (b) Plutonium
(c) Both a and b (d) None of a and b

50. Solar panels absorb:
(a) Light (b) Heat
(c) Current (d) Water

51. There are hot, semi-molten rocks at some places at about _____ kilometer below the surface of earth:
(a) 10 (b) 20
(c) 100 (d) 1000

52. One Btu is equal to:
(a) 1044 joules (b) 1055 joules
(c) 1044 Newton (d) 1055 Newton

53. Industries consume almost_____ percent of energy resources:
(a) 20 (b) 50
(c) 70 (d) 90

Answers

1	(a)	2	(a)	3	(c)	4	(c)	5	(b)
6	(c)	7	(a)	8	(d)	9	(d)	10	(d)
11	(a)	12	(c)	13	(b)	14	(a)	15	(b)
16	(b)	17	(a)	18	(d)	19	(b)	20	(d)
21	(c)	22	(c)	23	(c)	24	(b)	25	(a)
26	(b)	27	(d)	28	(a)	29	(b)	30	(d)
31	(b)	32	(c)	33	(c)	34	(c)	35	(d)
36	(a)	37	(b)	38	(a)	39	(c)	40	(a)
41	(d)	42	(b)	43	(c)	44	(a)	45	(d)
46	(a)	47	(d)	48	(c)	49	(c)	50	(b)
51	(a)	52	(b)	53	(a)				

Answer the following short questions.

1. **Define energy and its unit.** **(LHR 2014 G-I, LHR 2017 G-I, LHR 2018 G-II))**

Ans. The ability of a body to do work is known as energy.
or Energy is the ability to do work.
Unit: The unit of energy is joule (J).

2. **Define kinetic energy. Give its example.**
(LHR 2014 G-1, LHR 2015 G-II, LHR 2016 G-II, LHR 2018 G-I)

Ans. Energy possessed by a body due to its motion is known as kinetic energy.
For example, when a cricket ball is hit with a bat, the ball runs fast. We say that the running ball possesses kinetic energy.

3. **What is the difference between Nuclear Fusion and Nuclear Fission?**

Ans. **Nuclear Fission** **(LHR 2017 G-I, LHR 2018 G-II)**
Nuclear fission is done in a nuclear reactor where energy is released in the form of heat. This heat can be used to produce electricity.
Nuclear fusion **(LHR 2019 G-I)**
Energy is also released when the nuclei of small atoms fuse together. This is known as nuclear fusion. It is also nuclear energy.

4. **What is meant by degradation of environment? (LHR 2015 G-I, LHR 2016 G-II)**

Ans. When pollution is added to the environment more than a certain limit, it is known as degradation of environment.

5. **Define chemical energy. (LHR 2014 G-I, LHR 2015 G-II, LHR 2016 G-I, LHR 2018 G-II)**

Ans. Sometimes, energy is emitted during chemical reactions. The source of this energy is the chemical bonds between atoms. When these bonds break, energy is released.

6. **What is meant by solar panels?** **(LHR 2016 G-I)**
(LHR 2015G-I, LHR 2016G-I, LHR 2017G-I, LHR 2018G-II, LHR (2019 G-I)

Ans. The solar panels absorb heat. These consist of large plates that have been painted black. The absorbed heat is used to heat houses on run a water heating system. Steam can also be produced by using reflectors or lenses that runs the turbines of generators and produce electricity.

7. **Write two properties of Gamma radiations.** **(LHR 2014 G-I)**

Ans. **Two properties of Gamma radiations are:**
(i) γ-rays are ejected from the nucleus.
(ii) These are not affected by electric or magnetic field.

8. **Write definition of potential energy.** **(LHR 2014 G-II)**

Ans. Energy possessed by a body due to its position is known as potential energy.

9. **Define nuclear fission.** **(LHR 2014 G-II)**

Ans. Nuclear fission is done in a nuclear reactor where energy is released in the form of heat. This heat can be used to produce electricity.

10. **Write definition of electrical energy unit.** **(LHR 2014 G-I)**

Ans. The unit of electrical energy is kilowatt-hour. The symbol of kilowatt-hour is Kwh. The electricity meter measures electricity in this unit. One kilowatt-hour is the amount of energy that is consumed by a 1000 watt appliance in hour.

11. What is meant by thermal pollution? (LHR 2014 G-II, LHR 2016 G-I)

Ans. The pollution caused in the environment by heat smoke, harmful gases is called as thermal pollution.

12. Write definition of Biomass.
(LHR 2014 G-II, (LHR 2015 G-I, LHR 2017 G-I, LHR 2018 G-II)

Ans. Biomass consists of all organic materials such as residue of crops, trees, plants, vegetable peels animals dung and savage, etc. Savage is that dirt which is remained after straining dirty water.

13. Write two suggestions for the conservation of energy.
(LHR 2015 G-I, LHR 2019 G-II)

Ans. Following are two suggestions for the conservation of energy:

i. The bodies of the vehicles should be made light so that they may consume less fuel.

ii. A large amount of energy is wasted in the industries as heat. This heat can be used for different purposes.

14. What is difference between Thermal power and Geo-Thermal power?
(LHR 2015 G-I)

Ans. In the method of thermal power, coal, oil and natural gas are burnt, while to make use of energy deep under the earth in the form of hot water or steam is known as geo-thermal power.

15. What is the difference between solar energy and solar power?
(LHR2015G-I,LHR 2017 G-I)

Ans. Solar energy is the energy obtained from the Sun, while the production of electricity from solar energy is called solar power.

16. How can we get Biogas from Biomass? (LHR 2015 G-II)

Ans. The method of producing biogas from biomass is not complicated. Biomass is rotted in a closed tank or pit. Bacteria helps to fermentate it and biogas is the output that can be piped out easily.

17. Write briefly the importance of solar power? (LHR 2016 G-I)

Ans. You must have seen calculators that run without cells. The photocells installed in them transform light to electricity. Solar power is the energy obtained from the sun. Usually, the solar energy falling on the atmosphere of Earth is almost 1.4 kilowatt per square metre. The dust particles, water vapours and gases present in the atmosphere absorb, reflect or disperse most of the energy. But still about 1 kilowatt of energy per square metre reaches the Earth's surface.

18. How tidal energy can be used to produce electricity? (LHR 2016 G-I)

Ans. A dam is constructed for this purpose. At the arrival of high tide, water is trapped in the dam. On return of tide, trapped water is allowed to flow out in such a way that it turns the turbine. The generator joined to the turbine produces electricity.

19. What is meant by thermal unit? (LHR 2016 G-I)

Ans. These days, gas bills are being charged on the base of Btu instead of cubic metres. The Btu is a unit of energy called the British Thermal Unit. One Btu is equal to 1055 joules.

20. Differentiate between heat energy and light energy. **(LHR 2016 G-II)**

Ans. Heat energy produces due to molecular motion while energy due to which we see things is known as light energy.

21. Define thermal power. **(LHR 2016 G-II)**

Ans. Production of electricity from burning fossil fuels is called thermal power.

22. Define radiations. **(LHR 2016 G-II)**

Ans. Radiation is the mode of transfer of heat from one place to another in the form of waves, viz, electromagnetic waves.

23. Define kilowatt hour. **(LHR 2017 G-I, LHR 2017 G-II)**

Ans. One kilowatt-hour is the amount of energy that is consumed by a 1000 watt appliance in hour.

24. How many joules are there in one Btu?

Ans. One Btu is equal to 1055 joules.

25. Define heat energy. **(LHR 2017 G-II)**

Ans. Heat is also a form of energy and it is due to the movement of the molecules of bodies. The faster the movement of molecules, the greater is the heat energy. The sun is the largest source of heat energy.

26. What is sewage? **(LHR 2017 G-II)**

Ans. Sewage is a water-carried waste, in solution or suspension, that is intended to be removed from a community.

27. What do you mean by solid waste? **(LHR 2017 G-II)**

Ans. Solid waste means any garbage, refuse, sludge from a waste water treatment plant, water supply treatment plant and other discarded materials including solid, liquid or semi-solid, etc.

28. What is work? Write its equation. **(LHR 2018 G-I)**

Ans. Work is the product of force and distance in the direction of force.

Formula: Force × Distance covered in direction of force = Work

29. Define tidal power. **(LHR 2018 G-I, LHR 2019 G-II)**

Ans. The production of electricity from tidal energy is called tidal power.

30. How fossil fuels is produced? **(LHR 2018 G-I)**

Ans. Fossil fuel is produced from the remains of those plants and animals of remote past, which were buried under the earth.

31. *What do* you mean by solar power? **(LHR 2018 G-I)**

Ans. Solar power is the energy obtained from the Sun. For example, you must have seen calculators that run without cells. The photocells installed in them transform light (from the Sun) to electricity.

32. Write two steps to minimize environment degradation. **(LHR 2019 G-I)**

Ans. Following are two steps to minimize environment degradation.

i. Forestation should be increased so that the balance of environment may not be shattered.

ii. Better system of public transport should be introduced as it can reduce pollution to much extent.

33. How the electricity is produced through thermal power? (LHR 2019 G-I)

Ans. The chemical potential energy is stored in fossil fuels. The burning of these fuels gives out heat which is used to generate steam that turns the turbines to produce electricity. Thus, in this way, electricity is produced through thermal power.

34. Define pollution. (LHR 2019 G-I)

Ans. The unpleasant change occurring in air water and surface of earth that causes unhygienic effects on the human and animal life as well as on the plants is called pollution.

35. What is meant by fuse? (LHR 2019 G-I)

Ans. Fuse is such a device which does not allow current to pass through it over a certain limit.

36. On which factors, the kinetic energy of a moving body depends upon? (LHR 2019 G-II)

Ans. The kinetic energy of moving body depends upon its mass and speed. The more the mass or speed of a body the more is its kinetic energy.

37. What is meant by nuclear fission and nuclear fusion? (LHR 2019 G-II)

Ans. Nuclear energy is obtained by breaking the nuclei of heavy atoms. The process is called nuclear fission.

Energy is also released when the nuclei of small atoms fuse together. This is known as nuclear fusion.

38. Write name of four non-traditional methods of electricity production.

Ans. Following are the name of four non-traditional methods of electricity production.

(i) Solar power (ii) Wind power

(iii) Tidal power (iv) Geothermal power

39. What do you mean by biogas?

Ans. Biogas is produced by the decomposition of biomass. It is commonly utilized as fuel in countryside areas.

40. What is nuclear fuel?

Ans. Any material, which is utilized to obtain nuclear energy, is called nuclear fuel. For example, uranium 235 or plutonium is used as fuel in nuclear fission.

41. Define the process of nuclear fission.

Ans. When the nucleus of a heavy atom is broken, a large amount of energy is released in the form of heat. This process of nuclear break down is known as nuclear fission.

42. How Fossil Fuels are formed? (LHR 2015 G-I, LHR 2017 G-I)

Ans. The ancient remains of plants and animals buried for millions of years under the Earth are changes into fuels, called fossil fuels. Coal, oil and natural gas are examples of fossil fuels.

43. State the law of conservation of energy.

Ans. The law of conservation of energy state that:

"Energy can neither be created nor destroyed".

44. Which process of plants cannot be completed without the presence of light?

Ans. Preparation of food by plants through the process of photosynthesis require light as a source of energy.

45. Define power. What is its unit?

Ans. The energy consumed in one second is called power.
Power = Energy / Time
The unit of power is watt. The symbol used for this is W.

46. What do you mean by one kilowatt-hour?

Ans. One kilowatt hour is the amount of energy that is consumed by a 1000 watt appliance in one hour.

47. Differentiate between kinetic energy while energy due to position is called potential energy.

Ans. Energy due to motion is called kinetic energy while energy due to position is called potential energy.

48. Define thermal power and geothermal power. **(LHR 2015 G-II)**

Ans. Production of electricity from the burning of fossil fuels (coal, oil, natural gas, etc.) is called thermal power while production of electricity by steam or hot water coming from the earth is called geothermal power.

49. Define thermal position.

Ans. The environment pollution caused by the heat, smoke and harmful gases are called thermal pollution.

50. *Define* hydroelectric power. **(LHR 2018 G-I)**

Ans. The conversion of the kinetic energy of running water to electrical energy is known as hydroelectric power.

51. What happens when an electron jump from a higher energy orbit to a lower energy orbit?

Ans. When the electrons revolving around the nucleus jump from a higher energy orbit to a lower energy orbit light is emitted.

52. What do you mean by electrical energy?

Ans. Electrical energy is the energy of moving or flowing charges.

53. What is the unit of work?

Ans. Joule is the unit of work.

54. What do you mean by work?

Ans. Work is the product of force and distance in the direction of force.

55. Which atom is used as fuel in nuclear fission?

Ans. Uranium 235 or Plutonium is used as fuel in nuclear fission.

56. How solar energy is used as fuel in nuclear fission.

Ans. Solar energy is used in two ways:
Solar pannels absorbs heat.
Sunlight is directly transformed to electricity with the help of solar cells.

57. Define elastic potential energy. Give an example. ***(LHR 2019 G-I)***

Ans. The energy stored in a body by pressing, stretching or twisting is known as elastic potential energy. For example, if a piece of rubber or the rubber of a slingshot is stretched, an elastic potential energy is stored in it.

58. What is Btu?

Ans. It is a unit of energy called the British thermal unit.