Physics [Part 9 to 16]

9. Force and Pressure

1. Explain the term Force?

   Force is a push or a pull acting on an object which changes or tends to change the state of the object.

2. What is the Unit of Force?

   In the International system of units (SI System), the unit of force is newton (N).

3. What is the reason behind for the unit force (N)?

   Sir Issac Newton (1642 - 1727) One of the greatest scientists the world has ever seen. He was an English- mathematician, -physicist and astronomer. The SI unit of force is named after him.

4. Point out the other Units to measure the force?

   There are also other units that are used to measure force. They are dyne, kilogram weight and pound weight.

5. What is mean by State of Motion?

   A change in either the speed of an object or its direction of motion or both is described as a change in its state of motion. Thus, a force may bring a change in the state of motion of an object.

6. What is Contact Force?

   A force that can cause or change the motion of an object by touching it is called Contact force.

7. What is Muscular Force?

   The force Which is caused by the action of muscles. Hence this force is known as muscular force.

8. What is Frictional Force?

   The ball slows down due to the force acting between the ball and the ground. It is the force of friction which causes the ball to rest. The frictional force is always in a direction opposite to the direction of motion of the object

9. What is Non – Contact Force?

   A non-contact force is any force applied to an object by another body without any contact.

10. Explain Magnetic Force?

    Is it necessary to bring the two magnets in contact to observe the force between them? No. A magnet can exert a force on another magnet without touching it. Magnetic force is a non contact force.

11. What is Gravitational Force?

Why are objects fall towards the earth? It is because the earth pulls them down. This force is called the force of gravity. This is an attractive force. This is an example for non-contact force.

12. What is electrostatic force?

Force exerted by a charged body on another charged or uncharged body is known as electrostatic force. This force acts when the bodies are not in contact. The electrostatic force is another example of non contact force

13. What is Pressure? how will you measure it?

Pressure is defined as the force acting on a unit area. Pressure = Force/ Area on which it acts

The SI unit of pressure is N/m^2. It is also called pascal (Pa)

14. Is Pressure exerted by liquids and gases?

You know that liquids and gases are called fluids. Solids always exert pressure downwards. But the fluids exert pressure in all Directions. Fluids exert pressure on all bodies immersed in them and also on the walls of the container that holds them.

15. Is the Pressure of the liquid is depends upon the Gravitational force .Give one Example?

On the earth we have more gravitational force and hence the pressure exerted by the glass of water will be more. On the moon, the gravitational force is less compared to our earth. Hence the pressure exerted by a glass of water is less on the moon. So, pressure of a liquid depends on gravitational force.

16. How the Pressure of the liquid is calculated?

The pressure of a liquid can also be calculated by using a formula p = hdg

p = pressure of a liquid

h = height of the liquid column

d = density of the liquid

g = acceleration due to gravity

17. Define Pascal's Law.

The pressure applied to an enclosed liquid gets transmitted equally to every part of the liquid. This property was first demonstrated by Pascal and is called Pascal's law.

18. Is Air Exerts pressure on the wall of Objects . Explain it with Example.

We must have walked on the road while there is a strong wind. How did we feel? Did we feel any force while walking against the wind? What happens to the bicycle tube when it has a puncture From the above observations you can say that air also exerts pressure on the walls of their container.

19. What is Atmospheric Pressure?

The earth is surrounded by air all around. This thick envelope of air is called the atmosphere. The atmospheric air extends up to many kilometers above the surface of the earth. The pressure exerted by this air column is known as the atmospheric pressure.

20. How the Atmospheric pressure is decrease?

The atmospheric pressure at sea level is approximately 1,00,000 N/m^2 (or 10^5 N/m^2). As we go higher and higher above the earth surface, the atmospheric pressure decreases.

21. How the Atmospheric Pressure is Measured?

The atmospheric pressure is not the same at all places. It decreases as we go above the earth's surface. The instrument used to measure the atmospheric pressure is called Barometer.

22. What are the instrument that we used to measure the Atmospheric pressure?

In 1643, an Italian scientist named Torricelli invented the first barometer. It was a mercury barometer. Aneroid barometer and Fortin's barometer are other instruments used to measure the atmospheric pressure.

23. What is Friction?

The force which opposes the action of sliding your foot on the floor is called 'friction'. Friction is the force created whenever two surfaces move or try to move over each other.

24. How was the Friction is Caused?

Friction is caused by the irregularities on the two surfaces in contact. Even those surfaces which appear very smooth have a large number of irregularities on them. Irregularities on the two surfaces lock into one another. When we attempt to move any surface, we have to apply a force to overcome the interlocking. On rough surfaces there are larger number of irregularities. So the force of friction is greater if a rough surface is involved.

25. What are the Factors which are affecting Friction?

The force of friction depends on two main factors 1. Mass of the body 2. Nature of the surfaces in contact As the mass of the body increases, the force of friction also increases. A football when kicked goes farther than a cricket cork ball since the mass of the cricket ball is more than that of the foot ball. Friction is less when the surface is smooth. This you can understand by rolling a stone on a tar road(rough surface) and a house floor (smooth surface).

26. What are the Advantages of Friction?

    1. We are able to walk or run properly- on- the- floor- because of friction. If there is less or no friction we will slip and fall down.

    2. It would not be possible to light a match stick without friction between its head and the side of the matchbox.

    3. Cars and buses are able to run on the roads because of the friction between the wheels and the road.

    4. We cannot write on paper without friction between the tip of a pen or a pencil and the paper.

27. What are the Disadvantages of Friction?

    1. Friction produces heat. This heat causes wear and tear of the machinery parts.

    2. Vehicle tyres and soles of footwear wear out because of friction.

10. Motion

1. What is datum?

We take a point on the ground and we measure all distances with respect to this point which we call the datum.

2. What is frame of reference?

The three imaginary lines representing the three axes together with the datum is called the frame of reference.

3. What is state of motion?

A body is said to be in the state of motion, when it changes its position with respect to a datum over time.

4. What are the parameter for motion?

- A datum and a frame of reference
- The position of the object in relation to the datum or frame of reference
- Time

5. What are the types of motion?

- Linear motion – where the object moves along a straight line.
- Circular motion – where the object moves along a circular path.
- Oscillatory motion – where an object describes a repetitive to and fro movement retracing its original path in the opposite direction.
- Random motion – where the motion of the object does not fall in any of the above categories.

6. What is distance?

It is the length of the actual path followed by an object or body while moving from one point to another.

7. What is displacement?

It is the shortest distance between two points and is a vector quantity where direction is an essential feature.

8. Differentiate between distance and displacement?

- Distance: It is the length of the actual path followed by an object or body, while moving from one point to another.
- Displacement: It is the shortest distance between two points.
- Distance: It is a scalar quantity (having only magnitude).
- Displacement It is a vector quantity (having magnitude and direction)
- Distance: It is measured in metres in the SI system. It is measured in metres in a particular direction in the SI system.
- Displacement It is not a unique quantity and is always path dependent.

- Distance: It is only dependent on the starting point and the ending point and is independent of the path followed. It is unique to a given pair of points.
- Displacement: It can either be equal to or greater than displacement.
- Distance: It is either equal to or lesser than the distance. Distance in any direction would be a positive quantity, since direction is inconsequential.
- Displacement: It can be a negative quantity. If displacement in one direction is assumed to be positive then the displacement in the opposite direction would be a negative quantity

9. What is speed?

Speed is the rate of change of distance with respect to time or the distance travelled per unit time. The SI unit of speed is metres per second. It is a scalar quantity

10. What is velocity?

Velocity is the rate of change of displacement with respect to time. It is the displacement per unit time. The SI unit of velocity is metres per second. It is a vector quantity and therefore, the direction must always be specified along with the magnitude and the units.

11. What is acceleration?

Acceleration is the rate of change of velocity with respect to time or it is the rate of change of velocity in unit time. It is a vector quantity. The SI unit of acceleration is m/s per second, also written as m/s2 or ms^-2.

12. What is uniform speed?

Uniform speed/ velocity means that the speed/velocity remains constant over time. In the world around us, we notice that the speed of objects keeps changing from time to time. In such a case the distance/displacement – time graphs would not be a straight line.

13. What is slope of line?

The value DE/AD is called the slope of the line.

14. What are the three equation of motion?

v = u + at

s = ut + ½ at^ 2

v2 – u2 = 2as

15. What is circular motion?

The movement of an object in a circular path is called circular motion.

16. What is centripetal acceleration?

Uniform circular motion is a special case, where the speed of an object

remains constant but the direction keeps on changing.

17. What is centripetal force?

The force that keeps the body going around in circular motion is called the Centripetal force. The Centripetal force acts perpendicular to the velocity and is always directed radically inwards towards the centre of the circle.

11. Work, Power and Energy

1. What is work?

Work is said to be done, when a force acts on a body and the point of application of the force is displaced in the direction of force.

2. Which results in acceleration?

When a force acts on a body at rest, it results in acceleration, which in turn results in velocity and displacement. In the definition of work, however, we are merely concerned about the resultant displacement and not the rate at which the displacement happens (velocity).

3. What is weight of object?

The weight of an object is the force of gravity acting on the object. When the object is lifted up from the ground to a point above, then work is said to be done against the force of gravity.

4. How is work measured?

Work (W) is measured as the product of the force (F) and the displacement (S) in the direction of the force. W = F x S

5. What is SI unit of work?

The SI unit for measuring the quantity of work done is the joule

6. How is joule considered?

One joule of work is said to be done when a force of one newton acting on a body displaces it by one metre.

7. What is power?

Power (P) is defined as 'the rate of doing work'. It can also be defined as 'the work done per unit time'.

8. How is power calculated?

Power (P) is calculated by dividing the work done (W) by the time taken (t) to do that work.

Power = work/time

9. What is SI unit of power?

The SI unit for measuring power is Watt. Power is said to be one watt when one joule of work is done in one second

10. What is energy?

Energy is defined as the capacity to do work.

11. What is SI unit of energy?

The SI unit for measuring energy is the same as that of measuring work, which is the joule.

12. Name some forms of energy?

Some important forms of energy are: chemical energy, light energy, heat energy, electrical energy, nuclear energy, sound energy and mechanical energy.

13. How do objects get energy?

(i) Energy in some other form is converted and added to the energy that the object already possesses. Energy can never be created.

(ii) Work is done.

14. What is law of conservation of energy?

'Energy can neither be created nor destroyed; it can only be changed from one form to another.'

15. What is isolated system?

When there are no influencing factors on the system from the surroundings, then we call it an isolated system or a closed system.

16. What is mechanical energy?

When a work is done on an object, then the object gains energy. The energy acquired by objects upon which work is done is known as mechanical energy.

17. What will be the result of work done on an object?

When work is done on an object, then it can result in one of the following:

(i) Increase in speed. (Kinetic Energy)
(ii) Increase in height or state of strain. (Potential Energy)

18. What is kinetic energy?

Energy possessed by an object due to its motion (or velocity) is called kinetic energy

19. What is the formula for kinetic energy?

Kinetic energy can be calculated using the formula KE = ½ mv^2 where 'm' is the mass of the moving body and 'v' is its velocity.

20. What is potential energy?

The energy possessed by a body by virtue of its position or due to a state of strain, is called potential energy.

12. Laws of Motion and Gravitation

1. What is force?

Force is one which changes or tends to change the state of rest or of uniform motion of a body. Force is a vector quantity. Its SI unit is newton.

2. What is balanced force?

Forces acting on an object which do not change the state of rest or of uniform motion of it are called balanced forces

3. What is unbalanced force?

The block moves in the direction of the greater force. The resultant of two opposite forces acts on an object and brings it to motion. These opposite forces are called unbalanced forces.

4. What is laws of motion?

Galileo observed the motion of objects on an inclined plane. The first law of motion is stated as: An object remains in the state of rest or of uniform motion in a straight line unless compelled to change that state by an applied unbalanced force.

5. What is inertia?

The tendency of objects to stay at rest or to keep moving with the same velocity, unless it is acted by an external force is called inertia.

6. What is momentum?

The momentum ‘p’ of an object is defined as the product of its mass ‘m’ and velocity ‘v’.

p = mv

7. What is second law of motion?

The second law of motion states that the rate of change of momentum of an object is directly proportional to the applied unbalanced force in the direction of force. Suppose an object of mass ‘m’ is moving along a straight line with an initial velocity ‘u’, it is uniformly accelerated to velocity ‘v’ in time ‘t’ by the application of constant force ‘F’, throughout the time ‘t’.

Rate of change of momentum=change of momentum/time

8. What is one unit of force?

One unit of force(1N) is defined as the amount of force that produces an acceleration of 1 ms-2 in an object of 1 kg mass.

9. What is Newton third law of motion?

Newton’s third law of motion states

that for every action there is an equal and opposite reaction. It must be remembered that the action and reaction always act on two different objects.

10. What is conservation of momentum?

The law of conservation of momentum states that, in the absence of external unbalanced force, the total momentum of a system of objects remains unchanged.

11. What is collision?

The total momentum before collision is equal to the total momentum after collision. The total momentum of two objects remain unchanged due to collision in the absence of external force. This law holds good for any number of objects.

12. What is magnitude of moment of force?

The magnitude of the moment of force about a point is defined as the product of the magnitude of force and the perpendicular distance of the point from the line of action of the force.

13. What id momentum of force?

Moment of force = F x d.

14. What is Newton`s law of gravitation?

Every object in the universe attracts every other object with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

15. What is mass?

Mass is the quantity of matter contained in a body.

16. What is weight?

Weight is the gravitational force acting on a body. It is a measure of how strongly gravity pulls on that body.

17. What is acceleration related to gravity?

The acceleration produced in a body on account of the force of gravity is called acceleration due to gravity.

18. What is Chandrayana I?

Chandrayaan-1 is a moon-traveller or moon vehicle.

19. When was ISRO launched?

It was launched by the Indian Space Research Organization (ISRO) in October 2008 from Srihari Kota in Andrapradesh and operated until August 2009.

20. What are the achievements of Chandrayana I?

The discovery of wide-spread presence

of water molecules in lunar soil.

• Chandrayaan's Moon Mineralogy Mapper has confirmed that moon was once completely molten.

• European Space Agency payload- Chandrayaan-1 imaging X-ray spectrometer (CIXS) detected more than two dozen weak solar flares during the mission.

• The terrain mapping camera on board Chandrayaan-1 has recorded images of the landing site of the US space-craft Apollo-15, Apollo-11.

• It has provided high-resolution spectral data on the mineralogy of the moon.

• Lunar Laser Ranging Instrument (LLRI) covered both the Lunar Poles and additional lunar region of interest.

• The X-ray signatures of aluminium, magnesium and silicon were picked up by the CIXS X-ray camera.

• The Bulgarian payload called Radiation Dose Monitor (RADOM) was activated on the very same day of its launch and worked till the mission ended.

• More than 40,000 images have been transmitted by Chandrayaan camera in 75 days.

• The Terrain Mapping Camera acquired images of peaks and craters. The moon

consists mostly of craters.

• Chandrayaan beamed back its first images of the Earth in its entirety.

• Chandrayaan-1 has discovered large caves on the lunar surface that can act as human shelter on the moon.

21. What is cryogenics?

The term Cryogenics is from Greek and means “the production of freezing cold”.

22. What is space station?

A space station is an artificial structure designed for humans to live and work in the outer space for a certain period of time.

13. Magnetism

1. Which is used to lift heavy iron loads?

Cranes are used to lift heavy iron loads.

2. Which is used in cranes?

Powerful magnets

3. What is the use of powerful electromagnets?

Powerful electromagnets are used to operate electromagnetic trains, lifts and escalators.

4. What is magnes?

There was a region called Asia Minor, where there was a town called Magnesia. It was full of mountains, rocks and plateaus. The only occupation for the people was grazing the cattIe. There was a shepherd named Magnes.

5. How did magnet got its name?

As it was discovered by Magnes, they called it Magnet and also Magnetite. Magnetite was the ore with attracting property found in that region.

6. What are called as magnetic stones?

Magnetite’s are natural magnets. They are called magnetic stones.

7. What is called as leading stones?

Natural magnets do not have a definite shape. When a magnet is freely suspended, it always comes to rest in north- south direction. That is why they are called leading stones or lode stones.

8. What is artificial magnets?

After learning the method of changing the piece of iron into magnet (magnetization) we have been making and using several kinds of magnet.

Such man-made magnets are called artificial magnets.

9. What is magnetic substances?

Substances that are attracted by magnet are called magnetic substances.

Iron, cobalt, nickel are magnetic substances.

10. What are non-magnetic substances?

Substances that do not get attracted by magnet are called non-magnetic substances. Paper, plastic are called non- magnetic substances.

11. What are poles of magnet?

The ends of a magnet have the strongest magnetic force. So most of the iron filings cling to the ends of the magnet. They are called poles of the magnet.

12. Which rests at north-south direction?

A freely suspended magnet always comes to rest in north-south direction.

13. What is north and south pole?

North seeking pole is called north pole. South seeking pole is called south pole

14. What is magnetic compass?

The Magnetic compass has been designed by using this directive property of the magnet.

15. What is electro- magnetic train?

Electromagnetic train is also called as suspension train. In France, it is called flying train. It does not require diesel or petrol.

14. Electricity

1. Which helps us to see in dark and heat up food?

Electricity lights up the bulbs for us to see even in the dark and heats up the oven to cook food.

2. How do we get electricity at home and school?

- The electricity we use at home and school comes from the substation in the neighborhood which draws power from the larger power stations.
- These power stations get electricity from the electrical plants.
- From the power station, electricity flows through cables and wires to the step up transformers where the voltage is raised to facilitate long distance travel.
- The substation transformers receive the current, lower the voltage and send it to pole transformers.
- From these transformers, electricity is supplied to homes, schools and buildings, wherever required.

3. What is turbines?

Inside the power stations, there are huge rotating wheels called turbines.

4. What is generator?

A simple generator consists of a coil of wire that rotates between the poles of a strong magnet. As the coil rotates, electric current is generated.

5. Give note on Tamil Nadu leads?

- Wind energy is an important, free, renewable, clean and non-polluting energy source.
- In a wind farm, huge windmills convert wind energy into electrical energy. Tamilnadu is the No.1 state in India, with the highest wind power generating capacity of about 5,000 MW.
- Most wind farms are in Thoothukudi, Kanyakumari and Thirunelveli Districts of Tamilnadu.

6. What is electric cell?

The electric cell is a source of electric current. It is a device which converts chemical energy into electrical energy.

7. What is electrolyte?

An electric cell has two different metal plates called electrodes kept inside a chemical called electrolyte.

8. What are the types of electric cell?

Primary and secondary cells

9. What is primary cell?

Primary cells are intended to be used only once and then discarded. They cannot be reused as the chemicals get used up, when the cells are in use and cannot be recharged.

10. What are secondary cells?

Secondary cells can be recharged and reused many times. They are also called Storage cells.

11. Who developed electric cell?

The first electric cell was developed by an Italian scientist Luigi Galvani and then improved by Alessandro Volta. It has been further developed into the modern day cell or torch battery. Now, we also have rechargeable alkali cells and solar cells. These solar cells convert light energy into electrical energy.

12. What is electric circuit?

An electric circuit is the continuous or unbroken closed path along which electric current flows from the positive terminal to the negative terminal of the

battery.

13. What do the electric circuit made of?

A circuit generally has:

a) A source of electric current - a cell or battery.

b) Connecting wires - for carrying current.

c) A device that consumes the electricity - a bulb.

d) A key or a switch – This may be connected anywhere along the circuit to

stop or allow the flow of current. When the current flows, the circuit is said to

be closed. When the current does not flow, the circuit is said to be open.

14. What is galvanometer?

Galvanometer is an instrument used to detect the flow of current in electrical

circuits. When current flows through the galvanometer, the needle gets deflected.

15. What is electric switch?

An electric switch is a device that opens or closes an electric circuit

16. What is electric eel?

The Electric eel is an electric fish. It is capable of generating powerful electric

shocks for hunting its prey and for self defence. The electric eel lives in the fresh water of the Amazon and the Orinoco river basins in South America.

17. What is conductors?

The materials that allow electric current to pass through them are conductors

18. What is electric fuse?

The wires will get overheated and the appliance will get damaged. This situation arises as a result of some fault in the circuit and can be extremely dangerous as it could cause fire. To prevent electric appliances from getting damaged as a result of excessive flow of current through them, a safety device called fuse is used. The fuse is a safety device used in an electric circuit.

19. What is miniature circuit breaker?

A miniature circuit breaker is an

automatically operated electric switch that protects an electric circuit during overload or short circuit. Circuit breakers are available in different sizes, and can protect small household appliances as well as high voltage devices.

20. What is electro magnet?

A material that becomes a magnet when current is passed is called an

Electromagnet

15. Electricity and Heat

1. How is electricity useful to us?

Electricity plays a very important role in our daily life. It is a form of energy that helps us in many ways. Most of the comforts of modern life would not be there, if there is no electricity.

2. What is power station?

power station is a place where electricity is produced on a large scale by using various sources of energy like water, wind, heat etc.

3. How is electric power controlled?

The electric power thus produced is used through circuits and controlled by switches.

4. What is electric circuit?

The flow of current requires a closed conducting path. This path is made by connecting a cell or a battery, a switch (key) and a bulb by means of wires. This

closed conducting path is known as an electric circuit.

5. What is simple circuit?

A circuit made up of a cell, a switch and a bulb is known as a simple circuit. When

the switch is put on, the bulb glows. This is because there is a continuous or closed path for the electric current to flow.

6. What is parallel circuit?

Observe the second circuit. Here each bulb is connected to the battery

terminals by separate wires. This type of circuit is known as parallel circuit.

7. What is series of circuit?

The first circuit as described above is given here. When you look at the circuit, it is obvious that the bulbs are connected end to end. This type of circuit is known as series circuit.

8. What are conductors?

We know that the metals like copper, aluminium, iron, gold, etc. allow electric current to pass through them. They are called Conductors.

9. What is insulators?

Materials like wood, plastic, rubber, glass etc. do not allow electric current

to pass through them. They are called Insulators.

10. Why is water good conductor of electricity?

The water we get from sources such as taps, hand pumps, wells and ponds

is not pure. It contains some small amount of natural salts and so, this water is a good conductor of electricity.

11. What is electrodes?

The two conductors that are immersed in the solution where the current enters and exits the solution are called electrodes (the copper plates in the above activity).

12. What is electrolyte?

A substance that conducts electric current either in the form of a solution or in a fused state is called an electrolyte (copper sulphate solution in the above activity).

13. What is electrolysis?

The process by which an electrolyte is decomposed with the help of electricity is called electrolysis.

14. What is electro refining?

This is a process by which metals like gold and silver are refined or purified.

15. What is electro plating?

This is a process in which a layer of one metal is coated over another metal by electrolysis.

16. What is lightening?

The most dramatic natural phenomenon we observe on the earth is lightning. Lightning is an electric spark.

17. What is static electricity?

Static electricity is the accumulation of electrical charges on the surface of a non-conducting material. It is called “static” because there is no current flow .

18. What are atom made of?

The atom is made of 3 types of particles. They are: (i) electrons(ii) protons (iii) neutrons.

19. What are the kinds of charge?

There are two kinds of charges.

a). Positive charge - the charge that is acquired by the glass rod when rubbed with silk

b). Negative charge – the charge that is acquired by the plastic rod when rubbed

with wool.

20. What is electroscope?

An electroscope is a device used to detect and measure electric charges. It works on the principle of transfer of charges by Conduction or Induction.

21. What are the different ways of transferring heat?

They are:

(i) Conduction

(ii) Convection

(iii) Radiation.

22. What is radiation?

The process by which heat is transferred without the help of any material or medium is called radiation.

16. Electricity and Energy

1. What is electric circuit?

A continuous and closed path of an electric current is called an electric circuit.

2. What is electric current?

Electric current is expressed by the amount of charge flowing through a particular area of cross section of a conductor in unit time.

3. What is coulomb?

The SI unit of electric charge is coulomb.

4. What is Ampere?

The electric current is expressed by a unit called ampere (A), named after the French Scientist Andre - Marie Ampere.

5. What is one ampere?

When one coulomb of charge flows in one second across any cross section of a conductor, the current in it is one ampere.

6. What is electrical potential difference?

The electric potential difference between two points in an electric circuit is the work done in moving a unit positive charge from one point to the other.

Potential difference (V) = work done / change

7. What is voltmeter?

The potential difference is measured by an instrument called voltmeter.

8. What is Ohm`s law?

Ohm's law states that at constant temperature the steady current (I) flowing through a conductor is directly proportional to the potential difference (V) between its ends.

$I \propto V$ (or) = V/I = Constant

9. How can we connect resistors?

Resistors can be connected in (a) series (b) parallel.

10. What is heating effect of electric current?

The rest of the energy may be expended in heat to raise the temperature of the gadget. If the electric circuit is purely resistive, the energy of the source continuously gets dissipated entirely in the form of heat. This is known as heating effect of electric current.

11. What is Joule`s law?

Thus for a steady current I, the amount of heat H produced in time t is

H = W = VQ

since, Q = It

Applying Ohm's law we get $H = I^2 Rt$.

This is known as Joule's law of heating.

The law implies that heat produced in a resistor is (1) Directly proportional to the square of current (I^2) for a given resistance, (2) directly proportional to the resistance (R) for a given current, (3) directly proportional to the time(t) for which the current flows through the resistor.

12. What is role fuse?

A common application of Joule's heating is the fuse used in electric circuits. It consists of a piece of wire made up of an alloy (37% Lead, 63% Tin).

13. Name the colour of wires and their use?

- One of the wires in the supply, usually with red insulation, is called live wire.
- Another wire, with black insulation, is called neutral wire. In our country, the potential difference between the two are 220 V.
- Another wire in green insulation is called earth wire.

14. What is electric power?

The rate of consumption of electric energy is termed as electric power. The power P is given by P = = VI (or) P = I^2R = The SI unit of electric power is watt (W).1 watt is the power consumed by a device that carries 1 A of current when operated at a potential difference of 1 V. Thus, 1 W = 1 volt × 1 ampere = 1 V A

15. What is commercial use of electric energy?

One watt hour is the energy consumed when one watt of power is used for one hour. The commercial unit of electric energy is kilowatt hour (KWh), commonly known as unit.

16. What is electrolysis?

When the current is passed through aqueous or molten solutions of inorganic acids, bases and salts, the conduction of electricity is always accompanied by chemical decomposition of the solutions. Such solutions are called electrolytes and the phenomenon of the conduction of electricity through electrolytes by chemical decomposition is called electrolysis.

17. What is electrochemical cells?

The cells in which the electrical energy is derived from the chemical action are

called electrochemical cells.

18. What is primary cell?

The cells from which the electric energy is derived by irreversible chemical reaction are called primary cells. The primary cell is capable of giving an electro motive force(emf), when its

constituents, two electrodes and a suitable electrolyte, are assembled together. The main primary cells are Daniel cell and Leclanche cell. These cells cannot be recharged.

19. What is leclanche cell?

A Leclanche cell consists of a glass vessel which is filled with ammonium chloride solution. Ammonium chloride solution acts as an electrolyte.

20. What is lead acid accumulators?

A lead-acid accumulator, the anode and cathode are made of lead dioxide and lead respectively. The electrolyte is dilute sulphuric acid. As power is discharged from the accumulator, both the anode and cathode undergoes a chemical reaction that progressively changes them into lead sulphate. When the anode and cathode are connected by a wire, the current flows from anode to cathode through the wire.

21. What is secondary cells?

The advantage of secondary cells is that they are rechargeable. The chemical reactions that take place in secondary cells are reversible.

22. What is accumulator?

When current is applied to a lead-acid accumulator, the electrochemical reaction is reversed. This is known as recharging of the accumulator.

23. What re good source of energy?

A good source of energy would be one

• Which would do a large amount of work per unit volume of mass

• Be easily accessible

• Be easy to store and transport

• Most importantly be economical.

24. What is the use of thermal power plant?

The term thermal power plant is used since fuel is burnt to produce heat energy

which is converted into electrical energy.

25. What is hydro power plant?

Hydro power plants convert the potential energy of falling water into electricity. Since

there are very few waterfalls which could be used as a source of potential energy, hydro

power plants are associated with dams.

26. What is biomass?

Given the large amount of live stock in India, this can also assure us a steady source of fuel. Since these fuels are plant and animal products, the source of these fuels is said

to be biomass.

27. What is solar energy?

The sun has been radiating an enormous amount of energy at the present rate for nearly 5 billion years and will continue radiating at that rate for about 5 billion years more. Only a small part of solar energy reaches the outer layer of the earth's atmosphere. Nearly half of it is absorbed while passing through the atmosphere and the rest reaches the earth's surface.

28. What is wind energy?

The kinetic energy of the wind can be used to do work. This energy was harnessed

by windmills in the past to do mechanical work. For example, in a water-lifting pump, the rotatory motion of windmill is utilized to lift water from a well. Today, wind energy is also used to generate electricity.

29. What is radio-active elements?

The phenomenon of spontaneous emission of highly penetrating radiations such as α, β, and γ rays by heavy elements having atomic number greater than 82 is called radioactivity and the substances which emit these radiations are called radioactive elements.

30. What is nuclear fission?

The process of breaking up of the nucleus of a heavier atom into two fragments with the release of large amount of energy is called nuclear fission.

31. What is nuclear fusion?

Nuclear fusion is a process in which two or more lighter nuclei combine to form a heavier nucleus

32. What is thermo nuclear reaction?

The fusion process can be carried out only at extremely high temperature of the order of 107 K because, only at these very high temperatures the nuclei are able to overcome their mutual repulsion. Therefore before fusion, the lighter nuclei must have their temperature raised by several million degrees. The nuclear fusion reactions are known as thermo nuclear reactions.

33. What is the fusion reaction in nuclear bomb?

The fusion reaction in the hydrogen bomb is $1H2 + 1H3 \rightarrow 2\ He4 + 0n1 + Energy$.

34. What is the advantage of nuclear reactivity?

- Nuclear reactivity is a measure of the state of a reactor regarding criticality.
- It is a useful concept to predict how the neutron population of a reactor will change over time.

- If a reactor is critical, that is, the neutron production is exactly equal to the neutron destruction, then the reactivity is zero.
- If the reactor is super critical (neutron production>neutron destruction) then the reactivity is positive i.e, unsafe. If the reactor is sub critical (neutron production<neutron destruction) then the reactivity is negative i.e, safe.

35. What is radiation exposure measured?

The radiation exposure is measured by the unit called roentgen(R). One roentgen is defined as the quantity of radiation which produces 1.6 x 1012 pairs of ion in 1 gram of air.

36. What is high and low tide?

Due to the gravitational pull of the moon on the earth, the level of the water in the sea rises and falls. If you live near the sea or ever travel to some place near the sea, try and observe how the sea-level changes during the day. The phenomenon is called high and low tides and the difference in sea levels gives us tidal energy.

37. What is wave energy?

The kinetic energy possessed by huge waves near the sea-shore can be trapped in a similar manner to generates electricity. The waves are generated by strong winds blowing across the sea. Wave energy would be a viable proposition only where waves are very strong.