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DIRECTORATE OF MINORITIES

MINORITY WELFARE DEPARTMENT

PAREEKSHA DIKSOOCHI

SSLC 2020-21

SCIENCE PASSING PACKAGE

DIRECTORATE OF MINORITIES. VV TOWERS, 20TH& 21ST FLOOR, MAIN, DEVARAJ URS ROAD, VASANTH NAGAR, BANGALORE, KARNATAKA 560001

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SCIENCE PASSING PACKAGE -2021

BLUE PRINT DESIGN TOTAL 80 MARKS

Part -A Physics	Part –B Chemistry	Part –C Biology
Total Marks 28	Total marks 25	Total Marks 27

MARKS DISTRIBUTION FOR THEMES AND UNITS COVERED

Sl. No	THEMES	UNITS	TOTAL MARKS
1	Materials in Daily Life	2. Acids, Bases and Salts 3. Metals and Non-metals 4. Carbon and its Compounds 5.Periodic Classification of Elements	25
2	World of Living	6. Life Processes 7. Control and Coordination 8. How do Organisms Reproduce? 9. Heredity and Evolution	22
3	Natural Phenomena	10. Light – Reflection and Refraction	08
4	How do things work?	12. Electricity 13. Magnetic Effects of Electric Current	17
5	Natural Resources	14. Sources of Energy 15. Our Environment 16. Sustainable Management of Natural Resources	08
		TOTAL	**80**

2021 QUESTION PAPER DESIGN

SI NO	OBJECTIVES	%	MARKS
1	KNOWLEDGE	20	16
2	UNDERSTANDING	55	44
3	APPLICATION	05	04
4	SKILL	20	16
	TOTAL	**100**	**80**

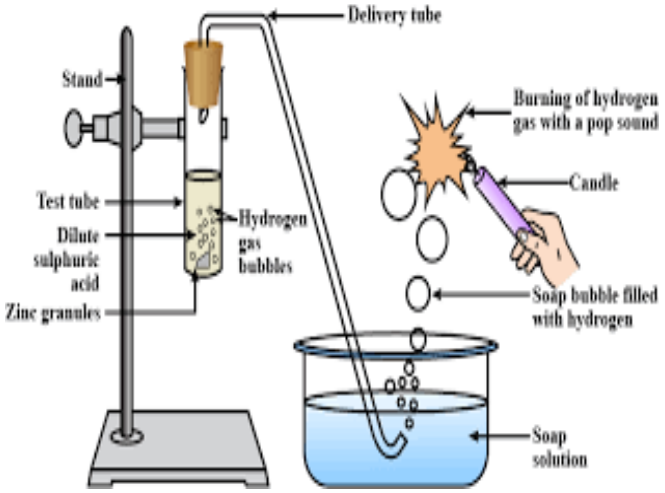
DIFFICULTY LEVEL

EASY	**40%**	**32 MARKS**
AVERAGE	**50%**	**40 MARKS**
DIFFICULT	**10%**	**08 MARKS**

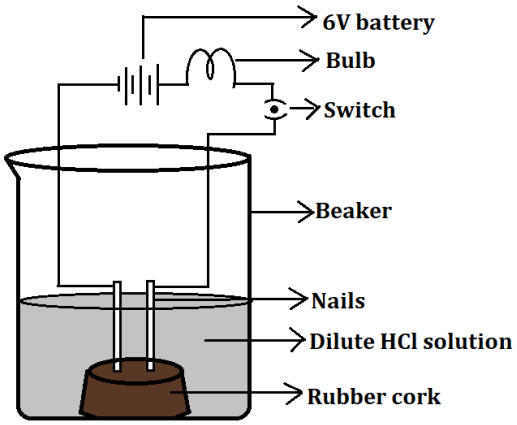
EXAM QUESTION PATTERN 888941

SI NO	QUESTION TYPE	NO OF QUESTIONS & MARKS
1	MULTIPLE CHOICE QUESTIONS	8X1=8
2	VERY SHORT ANSWER QUESTIONS	8X1=8
3	TWO MARKS QUESTIONS	8X2=16
4	THREE MARKS QUESTIONS	9X3=27
5	FOUR MARKS QUESTIONS	4X4=16
6	FIVE MARKS QUESTIONS	5X1=5
	TOTAL	38 QUESTIONS & 80 MARKS

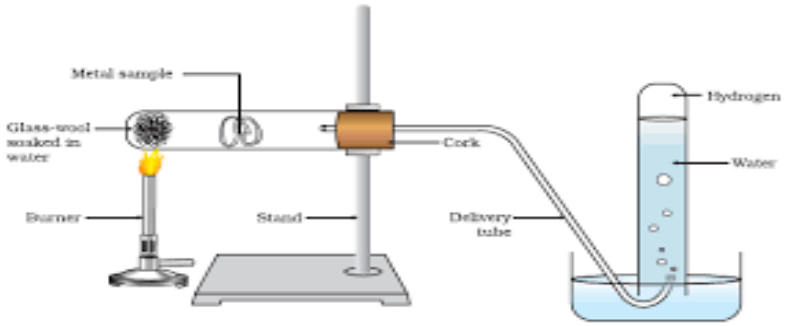
IMPORTANT DIAGRAMS FOR PRACTICE



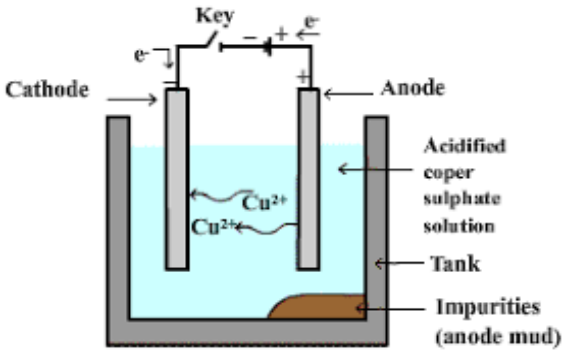
2.1 Reaction of zinc granules with dil sulphuric acid & testing hydrogen gas



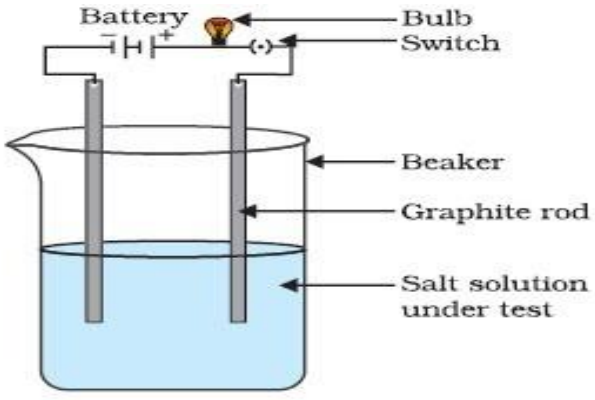
2.3 Acid solution in water conducts electricity



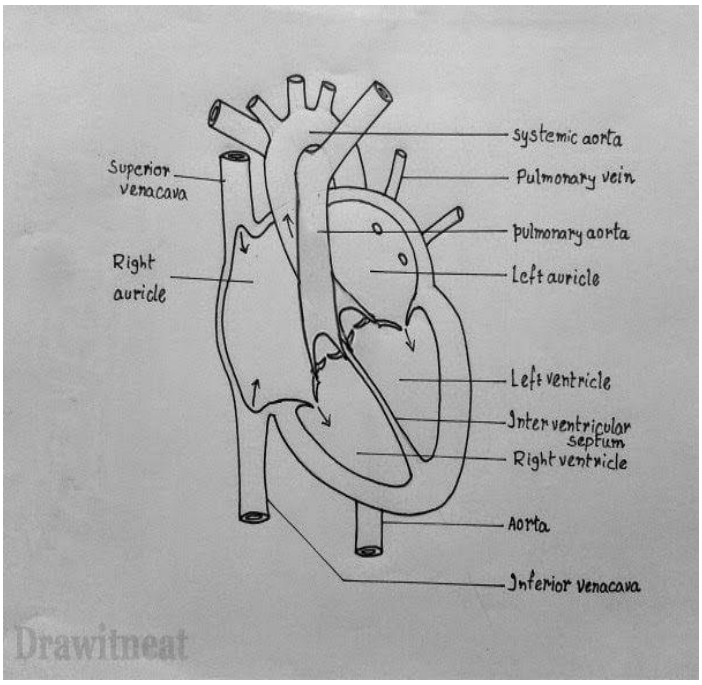
3.3 action of steam on metal



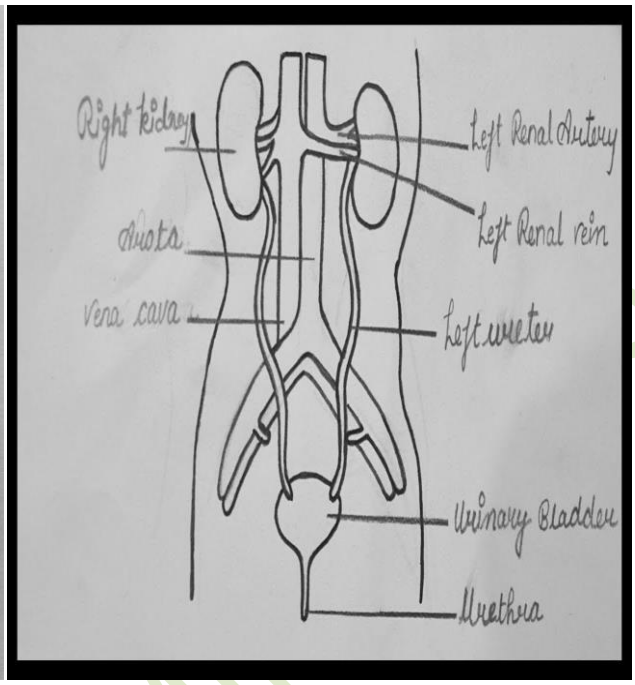
3.12 Electrolytic refining of copper



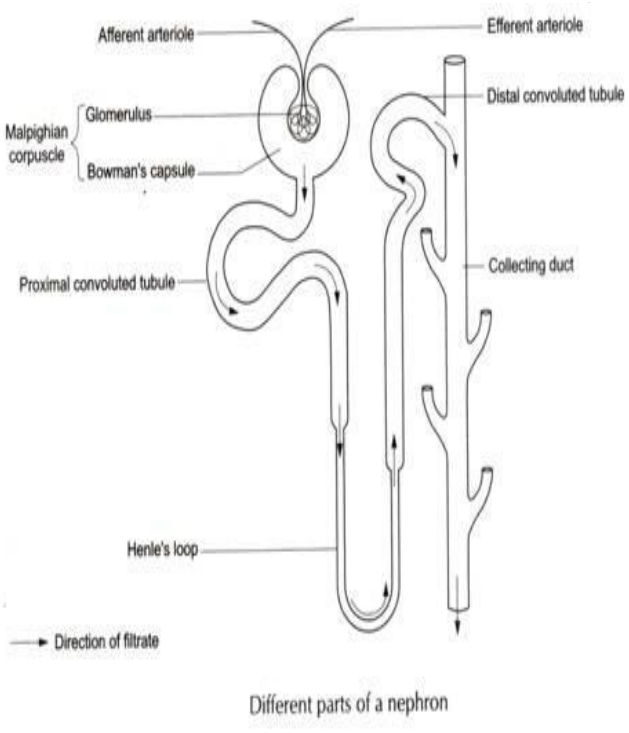
3.8 Testing the conductivity of salt solution



6.10 Schematic sectional view of the Human Heart

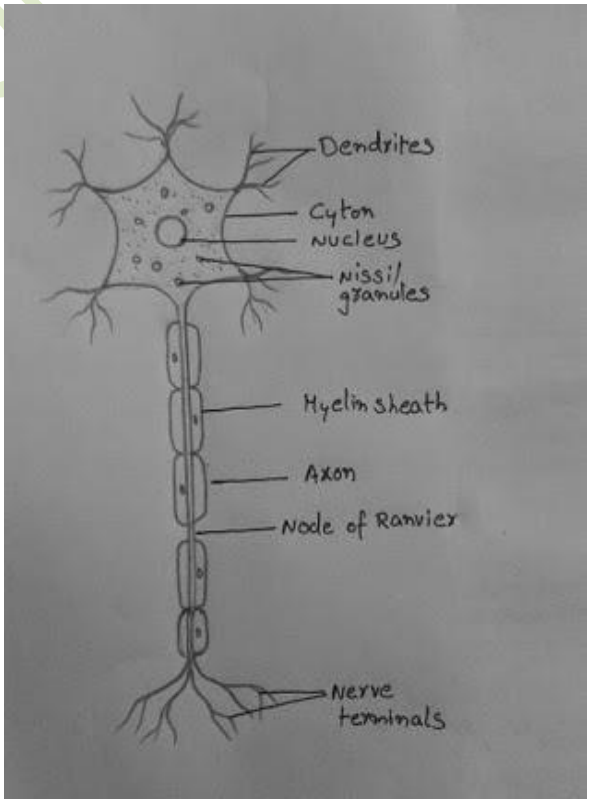


6.13 Excretory system in Human beings



Different parts of a nephron

6.14 structure of Nephron



7.1(a) structure of Neuron

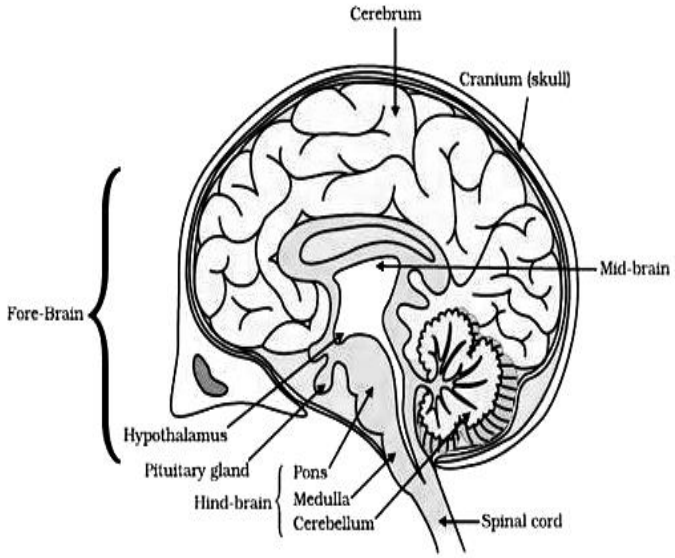
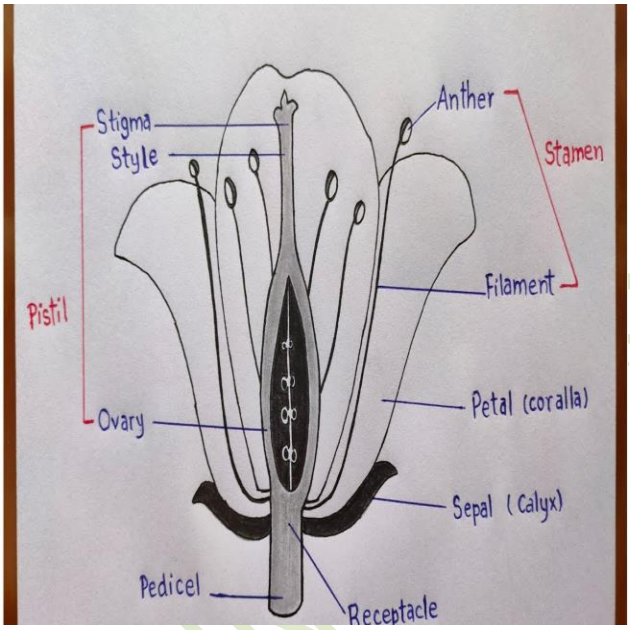
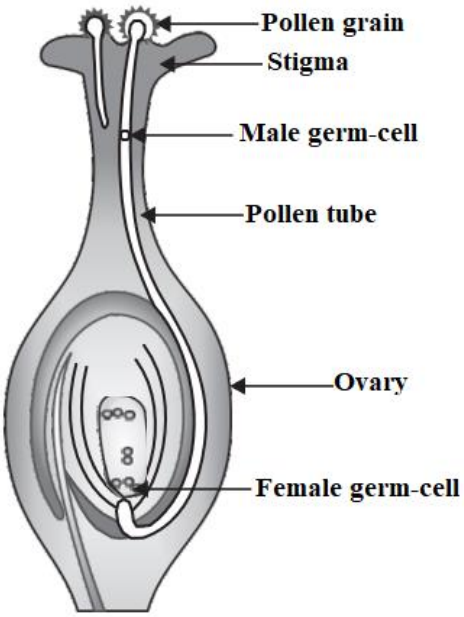


Figure: *Human brain*

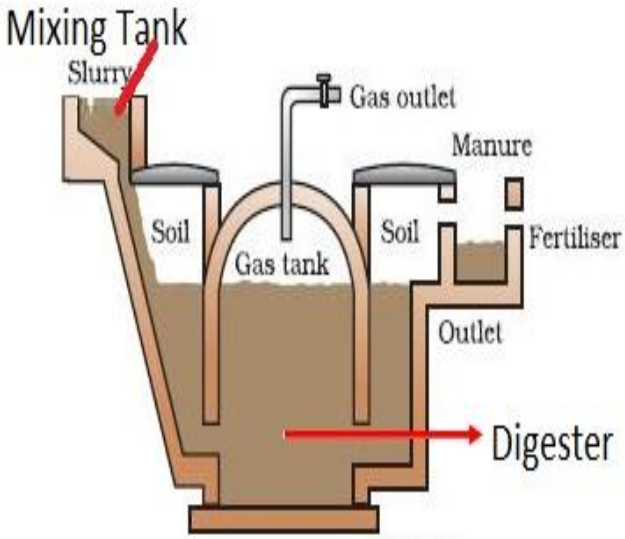
7.3 Human brain



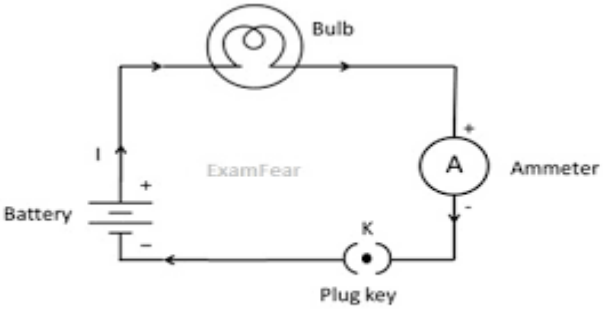
8.7 longitudinal section of flower



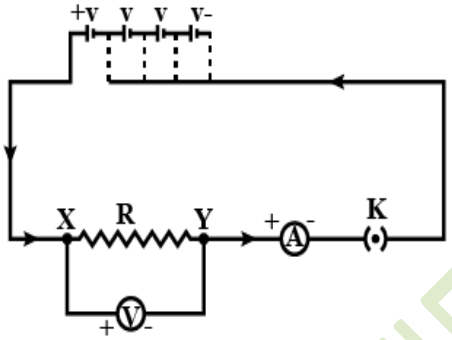
8.8 Germination of pollen on stigma



14.4 Schematic diagram of a Bio gas plant

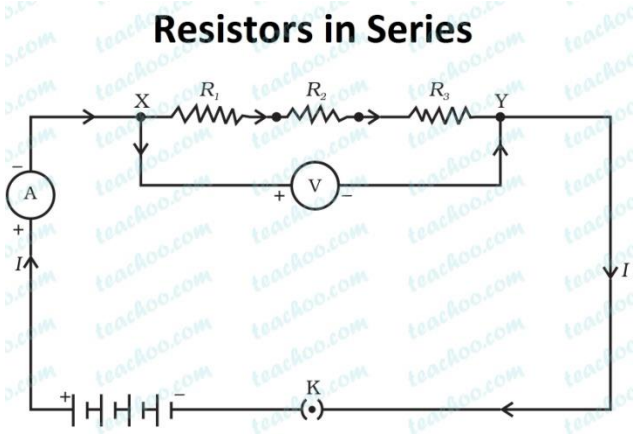


A schematic diagram of an electric circuit.

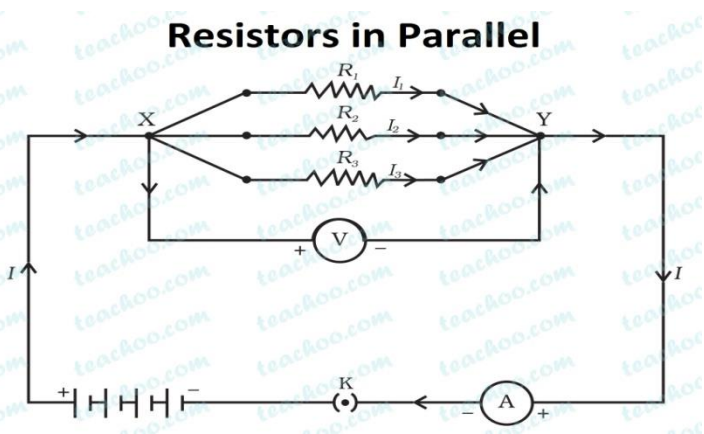


Electric circuit for studying Ohm's law

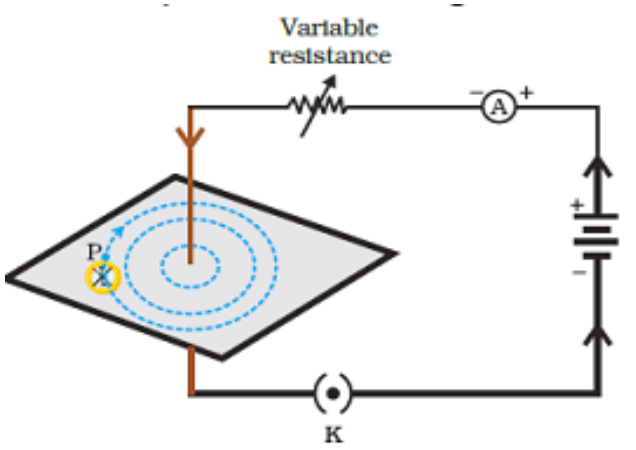
Sl. No.	Components	Symbols
1	An electric cell	
2	A battery or a combination of cells	
3	Plug key or switch (open)	
4	Plug key or switch (closed)	
5	A wire joint	
6	Wires crossing without joining	
7	Electric bulb	or
8	A resistor of resistance *R*	
9	Variable resistance or rheostat	or
10	Ammeter	
11	Voltmeter	



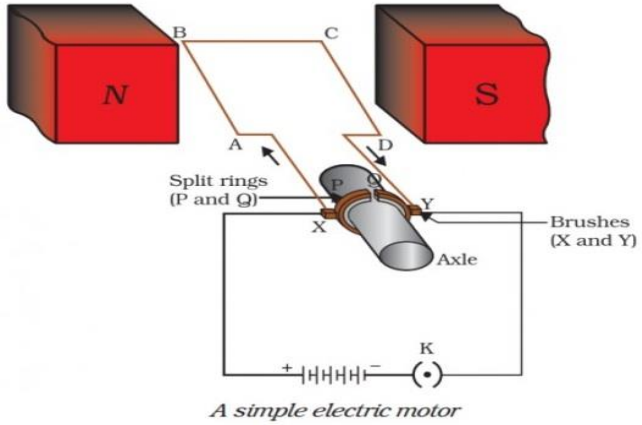
12.6 Resistors in series



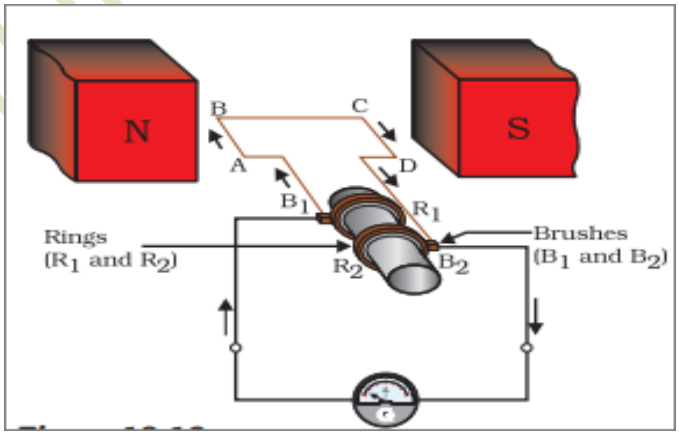
12.7 Resistors in parallel



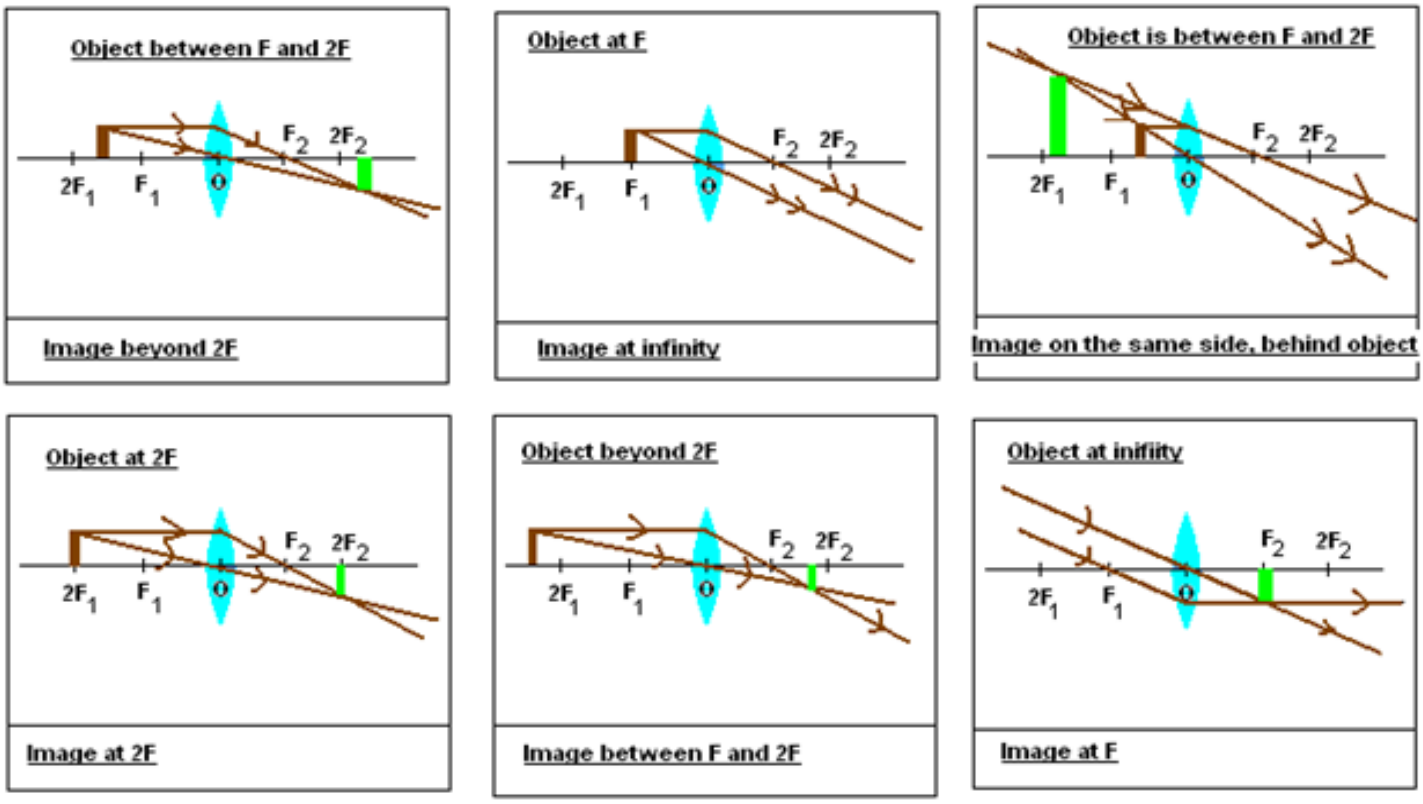
13.6(a) magnetic field around a straight conducting wire



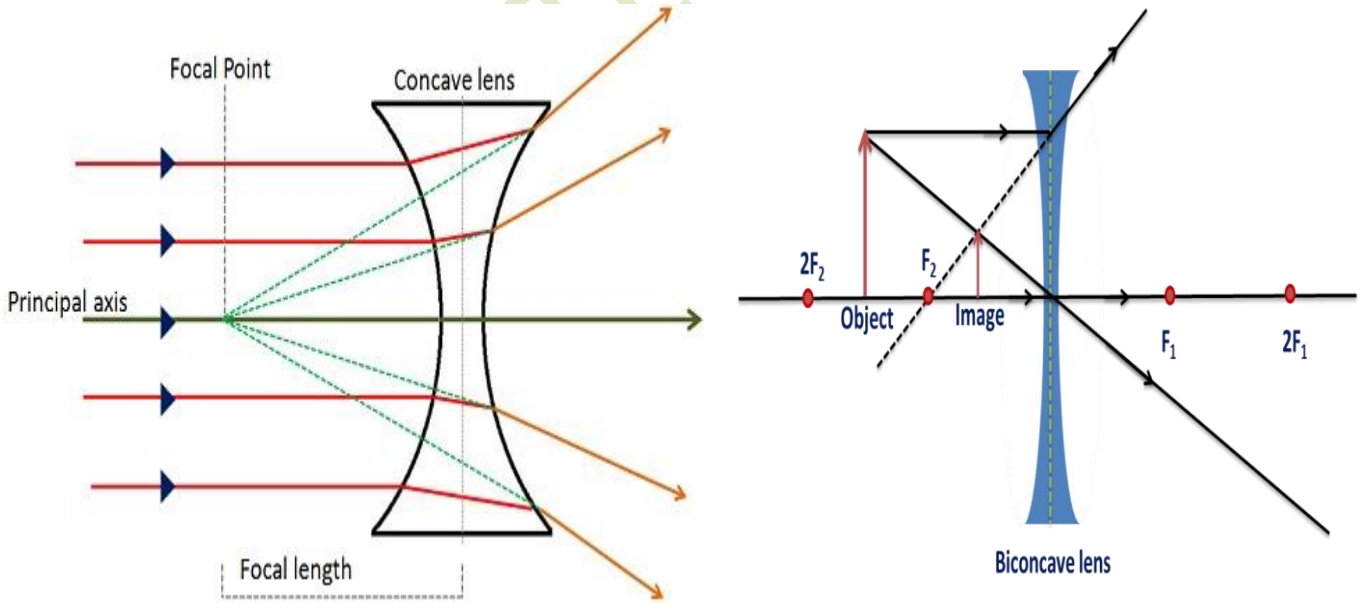
13.15 A simple electric motor



13.19 electric generator



10.16 position size and the nature of image formed by a **convex lens** for various positions of the object.



10.17 nature, position and relative size of the image formed by a **concave lens.**

Physics passing package

1. Electricity

1. OHM'S LAW

Ohm's law states that the current through a conductor between two points is directly proportional to the voltage across the two points. **V=IR**

2. Joules law of heating

The amount of heat produced in a current conducting wire, is proportional to the square of the amount of current that is flowing through the wire, when the electrical resistance of the wire and the time of current flowing are constant.

Or

Heat is produced in a resistor is (H)

(i) Directly proportional to the square of current for a given resistance (I)

(ii) Directly proportional to resistance for a given current (R)

(iii) Directly proportional to the time for which the current flows through the resistor. (t)

$H = I^2Rt$

3. Electric power (P)

An ***electric power*** measure of the rate of electrical energy transfer by an electric circuit per unit time.

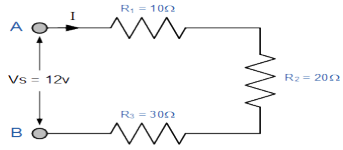
$P = VI$

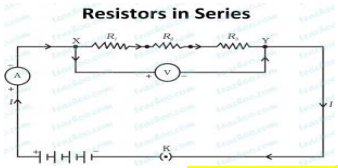
$P = I^2R$

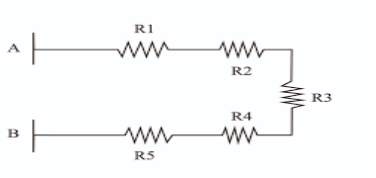
$P = V^2/R$

4. Resistors in series (R_S)

A ***series*** circuit is a circuit in which ***resistors*** are arranged in a chain, so the current has only one path to take.



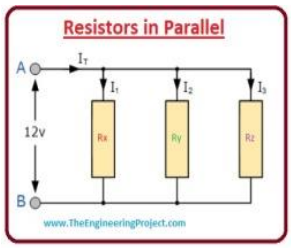


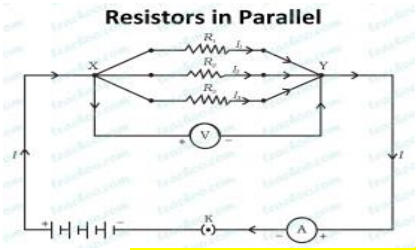


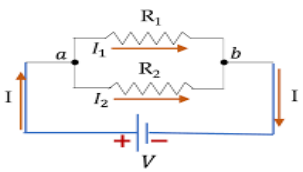
$R_S = R_1 + R_2 + R_3$

5. Resistors I parallel

Resistors in Parallel. A circuit is said to be connected in ***parallel*** when the voltage is the same across the ***resistors***.







1/RP = 1/R1 + 1/R2 + 1/R3

6. Electric current (I)

A stream of electrons moving through a conductor constitutes an electric current.

$I = Q/t$

Important S I unit

SI NO	QUANTITY	S I UNIT
1	Electric current (I) = Q/t	Ampere (A)
2	Electric charge (Q) = It	Coulomb (C)
3	Time (t) = Q/I	Second (S)
4	Potential difference (V) = W/Q	Volt (V)
5	Work done (W) = VQ	Joule (J)
6	Resistance	Ohm (Ώ)
7	Resistivity (rho)	Ώm
8	Electric power	Watt (W)
9	Electrical energy	Watt hour (Wh)
10	Commercial unit of electrical energy	Kilowatt hour (kWh)

7. Resistivity

It is an electrical resistance of a conductor of unit cross-sectional area and unit length.

$$R = \rho \frac{l}{A}$$

8. Factors on which the resistance of a conductor depends

i. On its length
ii. On its area of cross-section
iii. On the nature of its material

9. Difference between ammeter and voltmeter

Ammeter	Voltmeter
Used to measure the current.	Used to measure the potential difference.
Connected in series in the electric circuit.	Connected in parallel in the electric circuit.
Has low resistance	Has high resistance

10. Difference between resistivity and resistance

SI NO	RESISTIVITY	RESISTANCE
1	The resistivity of a material is the resistance of a wire of that material of unit length and unit cross-sectional area.	Resistance is opposition to the flow of electric current in a substance.
2	It is an intrinsic property.	It is an extrinsic property.
3	The resistivity of a conductor is always same and is independent of its length or size	The resistance of a conductor is dependent on its length or size.
4	The unit o resistivity is ohm-meter.	The unit of resistance is ohm.

Important definitions

1A	One ampere is constituted by the flow of one coulomb of charge per second. ($1A = \frac{1C}{1S}$)
1C	6 x 10^{18} electrons
1V	One volt is the potential difference between two points in a current carrying conductor when 1 joule of work is done to move a charge of 1 coulomb from one point to the other. $1V = \frac{1 \text{ joule}}{1 \text{ coulomb}}$
1Ώ	One ohm is, if the potential difference across the two ends of a conductor is 1V and the current through it is 1A. $1 \text{ ohm} = \frac{1 \text{ volt}}{1 \text{ ampere}}$
1W	One watt is the power consumed by a device that carries 1A of current when operated at a potential difference of 1V. 1W = 1 volt x 1 ampere
1Kilowatt	1000 watts
1kWh	1000 watt x 3600 seconds = 3.6 x 10^6 joule

Practical application of heating effect of electric current

1	Electric bulb	A strong metal with high melting point such as ***tungsten*** is used, because the bulb filament should be thermally isolated as much as possible.
2	Fuse	• It consists of a piece of wire made of a metal or an alloy. • Fuse is placed in ***series*** with the device. • It protects circuits and appliances by stopping the flow of any unduly high electric current. • For domestic purpose fuse rate: 1A, 2A, 3A, 5A, 10A etc.

Important questions with answer

1. Why is the series arrangement not used for domestic circuits?

Ans: because if **one** electrical appliance stops working due to some defect, then all other appliance also stop working as the whole **circuit** is broken.

2. What are the advantages of connecting electrical devices in parallel with the battery instead of connecting them in series?
   - There is no division of voltage among the appliances when connected in parallel.
   - The potential difference across each appliance is equal to the supplied voltage.
   - The total effective resistance of the circuit can be reduced by connecting electrical appliances in parallel.

3. Why are coils of electric toaster and electric irons made of an alloy rather than a pure metal?

Ans: The resistivity of an **alloy** is higher **than** the **pure metal**. ... **Alloy** does not melt readily and get deformed. **Alloys** have a low-temperature coefficient of resistance.

4. A current of 0.5 A is drawn by a filament of an electric bulb for 10 minutes. Find the amount of electric charge that flows through the circuit.

current (I) = 0.5 A

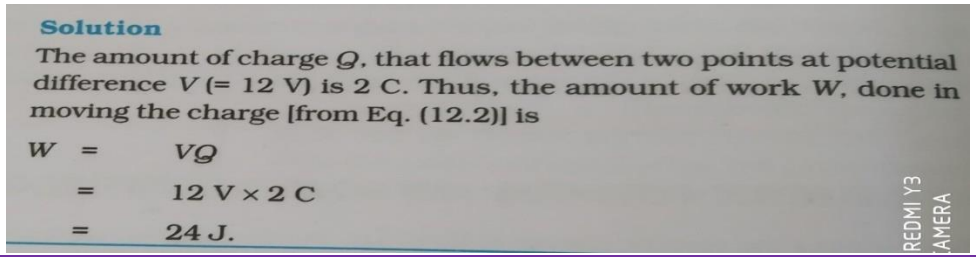
Time (t) = 10 minutes = 10 x 60 = 600 s

Using Q = I.t and substituting respective values, we have

Q = 0.5 x 600

= 300 C

5. How much work is done in moving a charge of 2 C across two points having a potential difference 12V?



Solution

The amount of charge Q, that flows between two points at potential difference V (= 12 V) is 2 C. Thus, the amount of work W, done in moving the charge [from Eq. (12.2)] is

$W = VQ$

$= 12\ V \times 2\ C$

$= 24\ J.$

6. (a) How much current will an electric bulb draw from a 220 V source, if the resistance of the bulb filament is 1200Ω?
   (b) How much current will an electric heater coil draw from a 220V source, if the resistance of the heater coil is 100Ω?

(a) given data V = 220 V, R = 1200Ω

From equation, $I = \frac{V}{R} = \frac{220\ V}{1200\Omega} = 0.18$ A

(b) Given V = 220 V, R = 100Ω

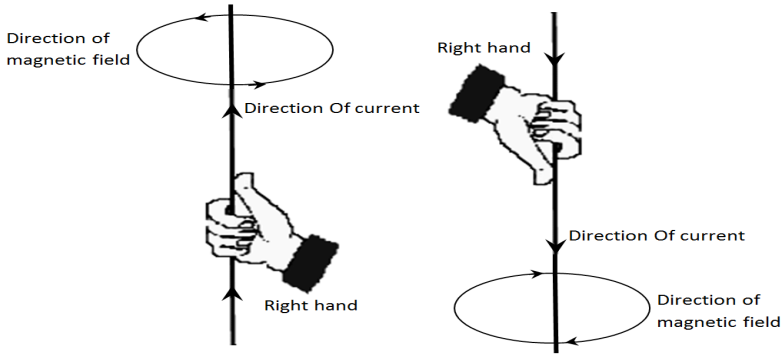
$I = \frac{V}{R} = = \frac{220\ V}{100\Omega} = 2.2$ A

2. MAGNETIC EFFECT OF ELECTRIC CURRENT

IMPORTANT RULES

1. Right-Hand thumb rule

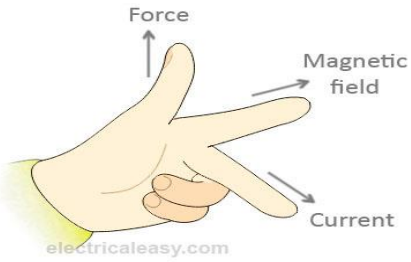
"If a current carrying conductor is imagined to be held in ***right hand*** such that
Thumb- points in direction of current
Then **curled fingers** of *hand* indicate the -direction of magnetic field. "



2. Fleming's left hand rule (motor rule)

When a current-carrying conductor is placed in an external magnetic field, the conductor experiences a force perpendicular to both the field and to the direction of the current flow.

Thumb	motion
Fore finger	field
Middle finger	current



3. Fleming's right hand rule (generator rule)

"Hold the right-hand forefinger, middle finger and the thumb at right angles to each other. If the forefinger represents the direction of the magnetic field, the thumb points in the direction of motion or applied force, then the middle finger points in the direction of the induced current."

Thumb	motion
Fore finger	field
Middle finger	Induced current

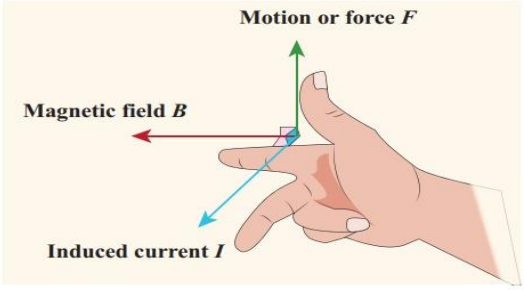
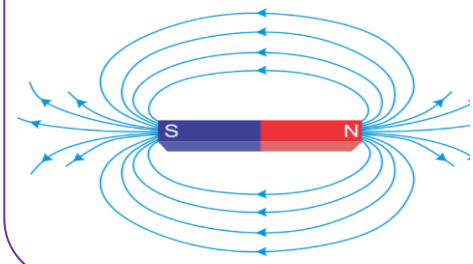


Figure 3.23 Fleming's right hand rule

Properties of magnetic field lines



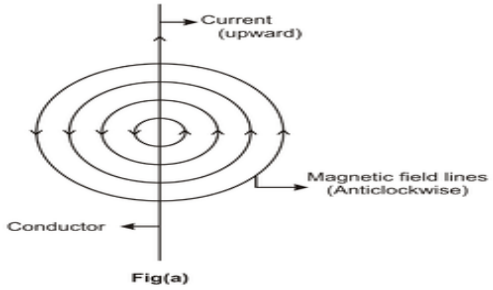
- They always form closed loops.
- No two magnetic lines intersect.
- It is vector quantity.
- They leave North Pole and enter South Pole.
- Outside they seem to travel from north to south and inside south to north.

Magnetic field due to a current carrying conductor

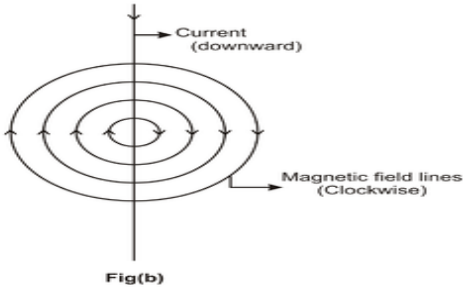
Direction of current	Deflection of compass needle
North to South	Towards East
South to North	Towards West

Magnetic field due to a current through a straight conductor

- If current flows in upward direction then direction will be anticlockwise.
- If current flows in downward direction then direction will be clockwise.



Fig(a)

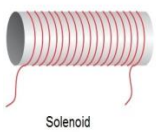


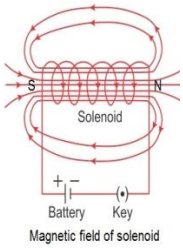
Fig(b)

Factors affecting the strength of magnetic field around a straight current carrying conductor

- Magnetic field strength is directly proportional to the magnitude of current flowing in the conductor.
  Greater the current in the conductor, stronger will be the magnetic field produced.
- Magnetic field strength is inversely proportional to the distance from the wire.
  Greater the distance from the current carrying conductor, weaker will be the magnetic field.

Magnetic field due to a current in a solenoid





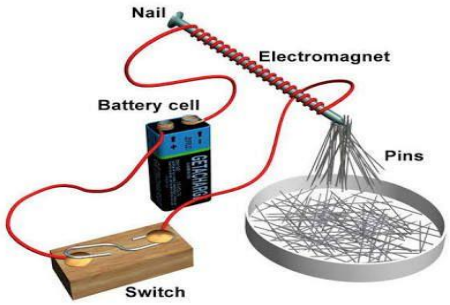
Magnetic field of solenoid

- When an electric current flow through a solenoid.
- Magnetic field is set up around solenoid similar to that of a bar magnet.
- One end of a solenoid act as a North Pole and other as South Pole.
- Magnetic field is represented by straight magnetic field lines parallel and very close to each other.

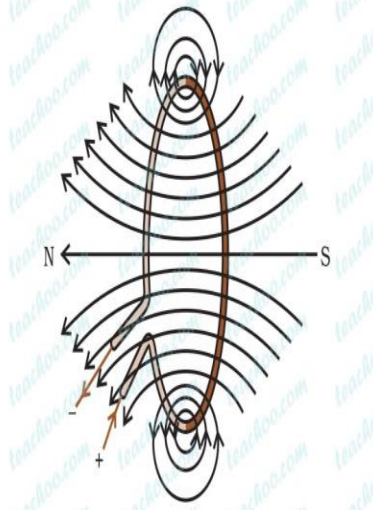
Electromagnet

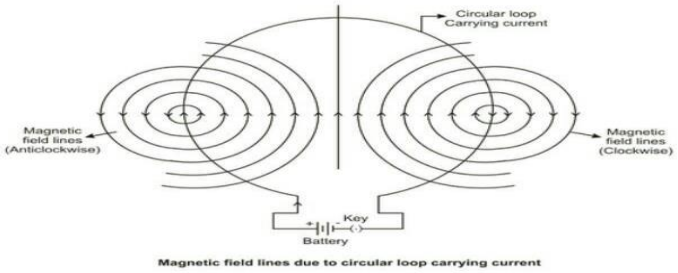
A strong magnetic field produced inside a solenoid can be used to magnetize a piece of magnetic material, when placed inside the coil to form magnet is called electromagnet.

Magnetic material: soft iron



Magnetic Field in a Circular Loop





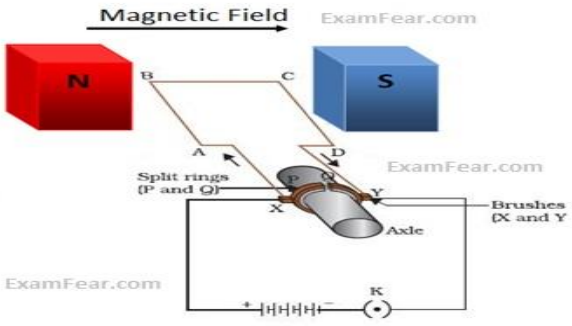
Magnetic field lines due to circular loop carrying current

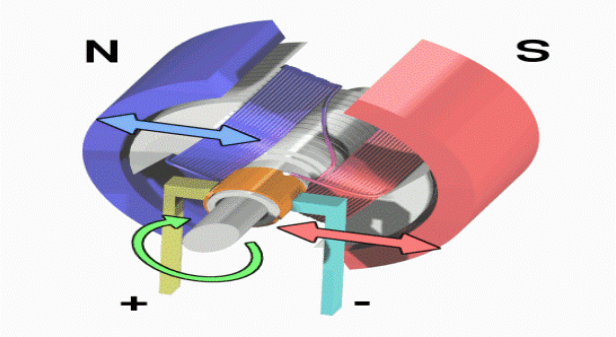
The magnetic field lines are concentric circles at every point of a current carrying circular loop. The direction of magnetic field of every section of the circular loop can be found by using the right hand thumb rule.

- At the centre of the circular loop, The magnetic field lines are straight.

Electric motor

Electric Motor is a device which converts electrical energy into mechanical energy.





Principle of Electric Motor:

The principle of the electric motor is based on the fact that a current carrying conductor produces a magnetic field around it. A current carrying conductor placed perpendicular to magnetic field experiences a force.

Construction of Electric Motor

(1) Armature coil: It consist of a single loop of an insulated copper wire in the form of a rectangle.

(2) Strong field magnet: Armature coil is placed between 2 pole pieces of a strong magnet which provide strong magnetic field.

(3) Split ring type commutator: It consist of 2 halves of a metallic ring. The two ends of armature coil are connected to these 2 halves of ring.

Role of split ring: Commutators reverses the direction of current in armature coil.

(4) brushes:Two carbon brushes press against the commutator. These brushes act as contact between commutator and terminal battery.

(5) Battery: It is connected across the carbon brushes. It supplies current to the armature coil.

Working of Electric Motor

(i) In the side AB of the rectangular coil ABCD, the direction of current is from A to B and in the side CD of the coil, the direction of current is from C to D. The direction of magnetic field is from N pole of the magnet to its S pole.

(ii) Applying Fleming's Left hand rule to sides AB and CD of the coil, the force on side AB of the coil is in downward direction whereas the force on side CD of the coil is in upward direction. Due to this the side AB of the coil is pushed down and side CD is pushed up. This makes the coil ABCD rotate in the anticlockwise direction.

(iii) While rotating, when the coil reached vertical position, then the brushes will touch the gap between the two commutator rings and current of the coil is cut off. Though the current to the coil is cut off when it is in the exact vertical position, the coil does not stop rotating because it has already gained momentum due to which it goes beyond the vertical position.

(iv) After half rotation, when the coil goes beyond vertical position, the side CD of the coil comes on the left side whereas side AB of the coil comes to the right side, and the two commutator half rings automatically change contact from one brush to the other.

(v) After half rotation of the coil , the commutator half ring R makes contact with brush B whereas the commutator half ring R makes contact with brush B .This reverse the direction of current in the coil.

(vi) The reversal of direction of current reverses the direction of force acting on the sides AB and CD of the coil. The side CD of the coil is now on the left side with a downward force on it whereas the side AB is now on the right side with an upward force on it. Due to this the side CD of the coil is pushed down and the side AB of coil is pushed up. This makes the coil rotate anticlockwise by another half rotation.

(vii) The reversing of current in the coil is repeated after every half rotation due to which the coil continue to rotate as long as current from the battery is passed through it.

The Commercial Motor uses

(1) Electromagnet in place of permanent magnet.

(2) A soft iron core on which coil is wound.

3) Large number of turns of the conducting wire.

Uses of D C motor

- Electric cars
- Toys. etc

Electric generator

It is a device which converts mechanical energy into alternating form of electrical energy.

Working Principle:

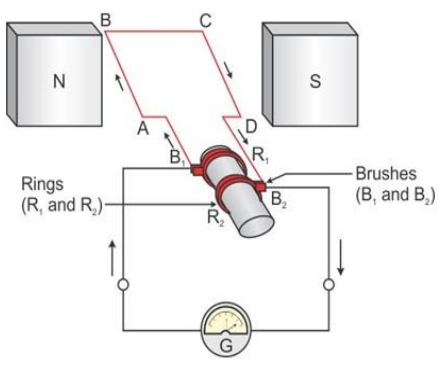
AC generator works on the principle of electromagnetic induction.

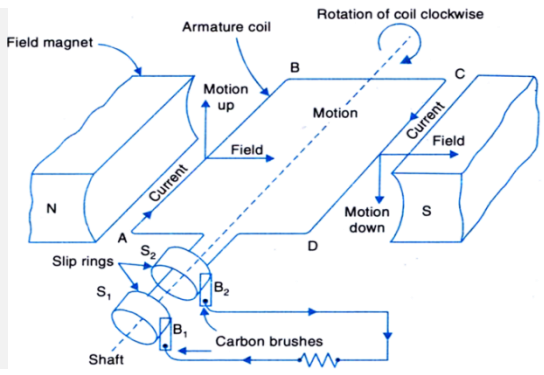
Construction:

It consists of the following main parts:

1. Field magnet: It is a strong horse shoe-type permanent magnet with concave poles.
2. Armature: ABCD is a rectangular armature coil. It consists of a large number of turns of insulated copper wire wound on a soft iron cylindrical core. It can be rotated about an axis perpendicular to the magnetic field of the field magnet.
3. Slip rings: These are two brass rings S1andS2rigidly connected to the two ends of the armature coil. As the coil rotates, slip rings also rotate about the same axis of rotation.
4. Brushes: These are two graphite rods B1and B2which are kept pressed against the slip rings S1and S2. Through these brushes, the current induced in the armature coil is sent to the external circuit.

Working of generator:





As shown in Fig,

Suppose the armature coil ABCD is in the horizontal position. Now the coil is rotated clockwise.
The coil cuts the magnetic lines of force. The arm AB moves upwards while the arm CD moves downwards.

According to Fleming's right hand rule, the induced current flows from A to B in arm AB and C to D in arm CD i.e., the induced current lows along ABCD.

The induced current flows in the circuit through brush B2 to B1.

After half the rotation of the armature, the arm CD moves upwards and AB moves downwards. The induced current now flows in the reverse direction i.e., along DCBA.

The current flows from B1 to B2.

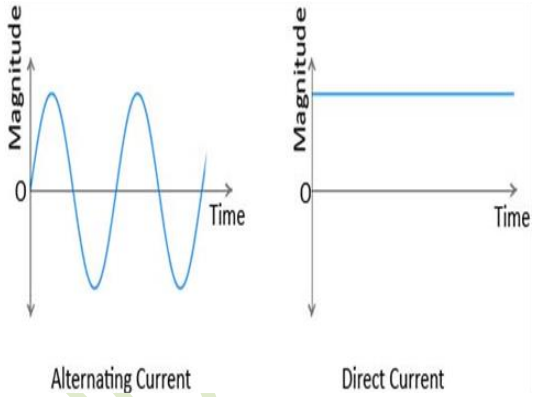
Thus the direction of current in the external circuit changes after every half rotation.

Such a current which changes its direction after equal intervals of time is called alternating current.

This device is called A.C. generator.

AC Generator	DC Generator
AC Generator is a device which converts mechanical energy to AC Electrical Energy	DC Generator is a device which converts mechanical energy to DC Electrical Energy
In AC Generator, Direction of electrical current reverses periodically.	In DC Generator, Direction of electrical current doesn't change
AC generator does not have commutators.	DC generators have commutators to make the current flow in one direction only.
It is used to power small electrical appliances.	It is used to power very large motors.
AC Generators require very less maintenance	DC Generators require frequent maintenance

Electric motor	Electric generator
1. Electric motor converts electrical energy into mechanical energy. 2. It uses electricity. 3. It is based on the principle that current carrying conductor placed in a magnetic field experiences a force.	1. Electric generator converts mechanical energy into electrical energy. 2. It generates electricity. 3. It is based on the principle of electromagnetic induction.



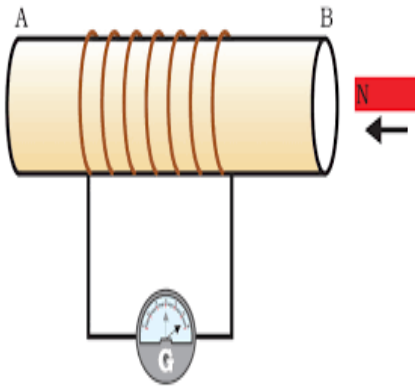
Difference between dc current and ac current

===DC current	===AC current
≥ IN DC current, electric charge flow only in one direction.	≥ IN ac current, electric charge changes its direction periodicly.
≥ DC current can not transfer at long distance because of very large energy loss.	≥ Ac current safe travel at long distance.
≥ The frequencies of dc current is zero.	≥ The generating frequencies is 50 hz to 60 hz in ac current.
≥ The current of magnitude verying with time is constant.	≥ The current of magnitude verying with time.
≥ The source of availability is battery or cell.	≥ The source of availability is generator or mains.
≥ IN dc circuit have only resistance.	≥ IN Ac circuit have resistance with capacitor and inductor.
≥ Power factor is always 1.	≥ IN ac power factor laies between o to 1.
≥ Its wave form are pure and pulsating.	≥ Its wave are sinusoidal, tringular, square, quasi square wave.

Electromagnetic Induction

- The production of electricity from magnetism is called Electromagnetic Induction.
- It was discovered by Michael Faraday.
- Direction of induced current is found with the help of Fleming's right hand rule.
- Induced current measured with help of Galvanometer.

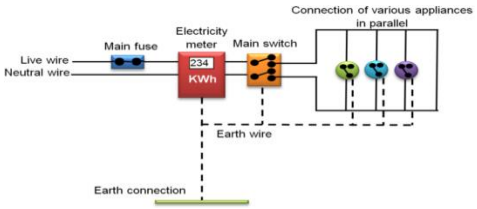
Faraday's Experiment

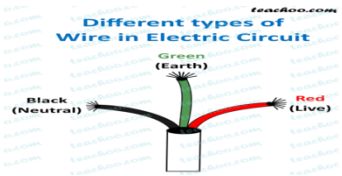


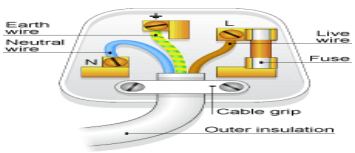
- Take a wire, a bar magnet and a galvanometer
- Move the magnet towards the coil of wire.
- The galvanometer moves to indicate a current in the wire.
- When the direction of the magnet is reversed, the current reverses (indicated by the galvanometer needle swaying in the opposite direction)
- When the speed of movement of the magnet changes, the galvanometer deflects faster.

Conclusion : Moving a magnet towards a coil induces a current in the coil whose direction and magnitude is given by the galvanometer.

Domestic electric circuits







10 a) Electric fuse :-

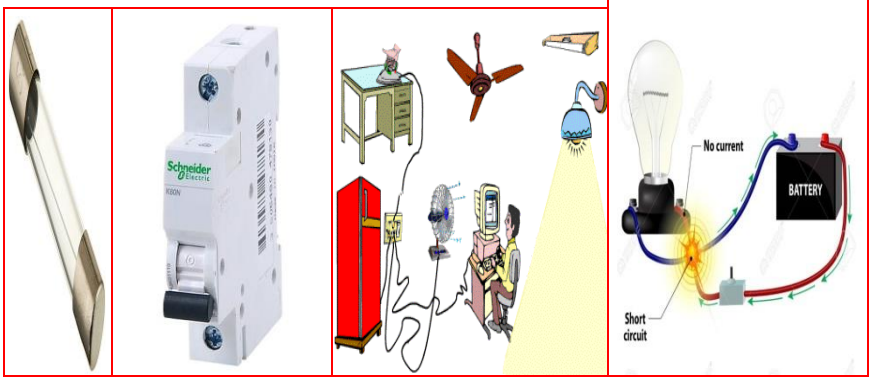
Electric fuse is a safety device used in electric circuits to protect the circuit and appliances from damage due to overloading and short circuit. It is a wire having high resistance and low melting point. If excess current flows through the circuit, the fuse wire melts and breaks the circuit. Fuse wire is made of a metal or an alloy of metals like lead, tin, aluminium and copper. Fuse wire is connected in series with the live wire.

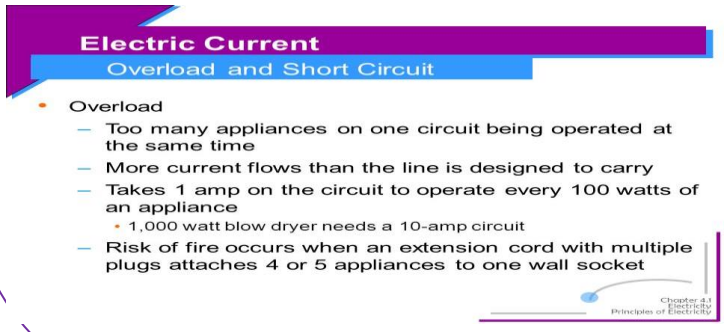
b) Overloading :-

Overloading is caused due to increase in voltage, or if the live wire and neutral wire comes in contact or if too many appliances are connected to a single socket. It results in overheating of the wires and can cause damage to the circuit and appliances.

c) Short circuit :-

Short circuit is caused when the live wire and neutral wire comes in contact and the current suddenly increases in the circuit. It causes spark, fire and damage to the circuit and appliances.



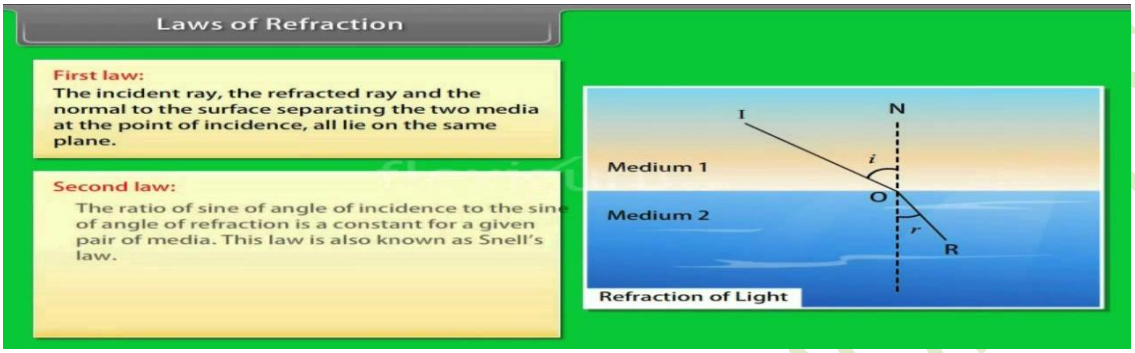


Some precaution that should be taken to avoid the overloading of domestic electric circuits are:

- we **should** not use too many appliances at the same time.
- we **should** not connect too many appliances from a single socket.
- we **should** use the fuse for protection **when** there is **overload**.

3.Light

Refraction of light: The phenomenon of bending of light when travels from one medium to another medium.

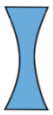


Meaning of refractive index values example

n_W= 1.33	This means that the ratio of speed of light in air and speed of light in water is equal to 1.33.
n_g = 1.52	This means that the ratio of speed of light in air and speed of light in crown glass is equal to 1.52.
n_d = 2.42	This means that the ratio of speed of light in air and speed of light in diamond is equal to 2.42.

Refraction by spherical lenses


Convex Lens


Concave Lens

Convex lens	Concave lens
Thicker in middle & thinner at edges	Thinner in middle & thicker at edges
Known as converging lens	Known as diverging lens

Terms related to spherical lenses

1. Optical centre (O) is defined as the point on the lens which is on the principal axis and the light ray doesn't deflect when passes through it.
2. Centre of curvature (2F1 & 2F2) is defined as the centre of the surface of sphere of which the lens is a part. Since, a lens has two surfaces, so the lens has two centres of curvatures.
3. Principal axis is defined as the straight lines passing through centre of curvature.
4. Aperture is defined as the diameter of the boundary of the circular lens.
5. Principal focus (F1 & F2) is defined as the point where beam of light parallel to principal axis, either converges or diverges after refraction.
6. Focal length (f) is defined as the distance between the optical centre and principal focus of the lens.

Image formation by convex lens

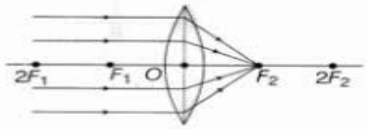
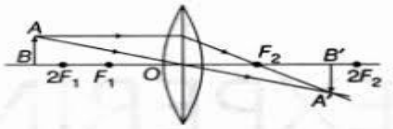
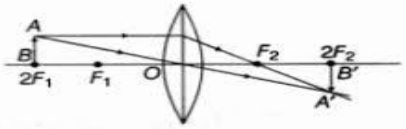
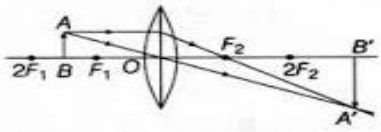
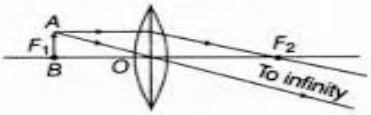
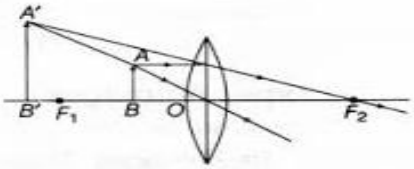
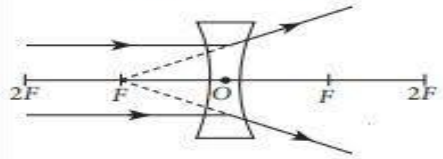
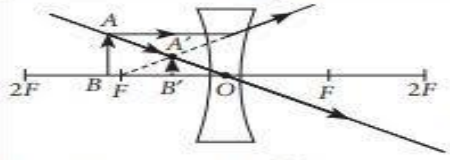
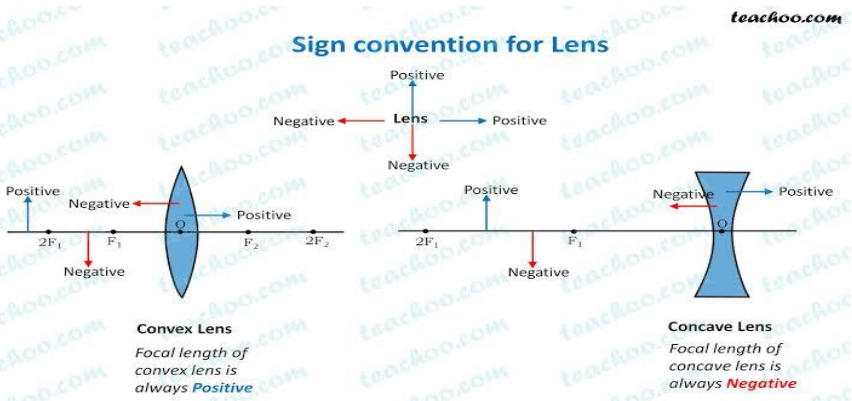
Position of object	Position of image	Size of image	Nature	Ray diagram
At infinity	At F_2	Extremely diminished	Real and inverted	
Beyond $2F_1$ (at finite distance)	Between F_2 and $2F_2$	Diminished	Real and inverted	
At $2F_1$	At $2F_2$	Same size	Real and inverted	
Between F_1 and $2F_1$	Beyond $2F_2$	Magnified	Real and inverted	
At F_1	At infinity	Highly magnified	Real and inverted	
Between lens and F_1	On same side of object	Magnified	Virtual and erect	

Image formation by concave lens

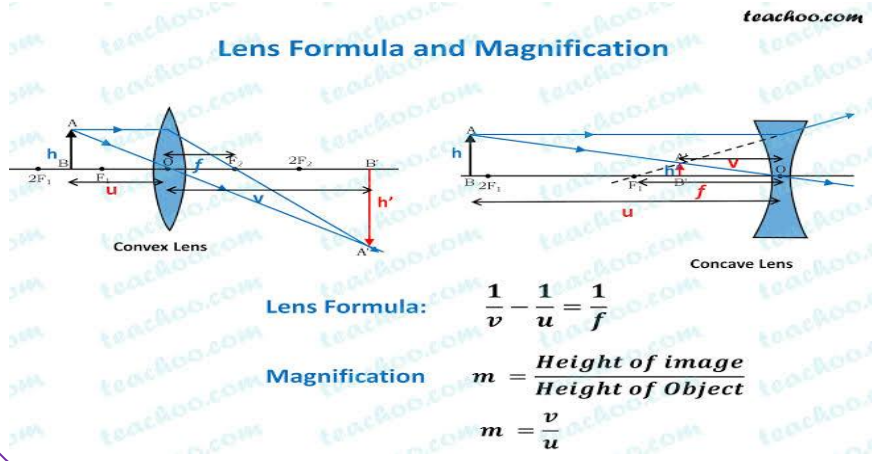
Concave lens				
	Ray diagram	Position of object	Position of image	Nature of image
(a)	 $u = -ve$, $v = -ve$ and $f = -ve$	At infinity	At F	Virtual, erect and highly diminished
(b)	 $u = -ve$, $v = -ve$ and $f = -ve$	Between infinity and O	Between F and O	Virtual, erect and diminished

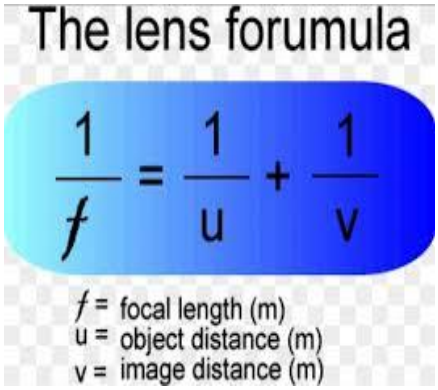
Sign convention for spherical lenses



Distance	Positive value (+)	Negative value (–)
u	Real	Virtual
v	Real	Virtual
f	Convex lens	Concave lens

Lens formula and Magnification





Power of a lens

- The power of lens is defined as the reciprocal of its focal length.
- S I unit power of lens is Dioptre. It is denoted by 'D'
- 1 dioptre is the power of a lens whose focal length is 1 meter.
- Power of convex lens is positive. Concave lens is negative.

$$P=\frac{1}{f}$$

Power of lens	Focal length	Type of lens
+ 2.0 D	+ 0.50 m	convex
- 2.5 D	- 0.40 m	concave

4.SOURCES OF ENERGY

What are the qualities of an ideal source of energy?

The ideal source should have the following qualities:

1. Should be cheap, easily available and easy to handle.
2. It can be transported easily.
3. It should have high calorific value.
4. It should have proper ignition Temperature.

List two advantages of producing hydroelectricity.

Answer:

Advantages of Hydroelectric Power

Hydroelectric power is pollution free.

Hydroelectric power- is dependable source of energy.

Lot of water is available in rivers, so the hydroelectric power is available free of cost. Money is spent only to construct dams and power stations

Renewable source of energy.

Write any four advantages of hydroelectric power.

Or

Renewable/Inexhaustible	Non- Renewable/exhaustible
1. They are also called inexhaustible	**1. They are also called exhaustible**
2. They are Pollution free.	**2. They are Pollutant.**
3. They are Abundant	**3. They are less quantity.**
4. e.g., sun, wind, water.	**4. e.g., fossil fuels-petrol, coal.**

Write any three disadvantages associated with hydro power plant.

Disadvantages of Hydroelectric Power :

Hydroelectric power is generated only near the rivers having water throughout the year. This electric power has to be carried to the substations for distribution to the houses and factories situated far off from the sites of hydro electric power stations. This is done through the transmission wires, so lot of money is to be spent on this process.

A large area of fertile land is submerged at the site of the dam constructed for tapping energy from the flowing water.

A large number of people residing near the site of a dam are dislocated. So, a lot of problems are to be faced in rehabilitating this population. That is why, there is a lot of opposition by the people around the site of dam for the construction of dam.

A large number of plants and wild life in the area of the dam are submerged in water. So, a large variety of flora (plants) and fauna (animals) is destroyed.

Hydroelectric dams cannot be constructed everywhere. They are constructed mostly in hilly areas.

What are the limitations in obtaining energy from wind ?

1. We cannot depend upon wind energy as it is available only when air is in motion. The appliances or machines operating with wind energy stop working as soon as wind stops. The minimum speed of wind to operate generator to produce electricity is about 15 km/h. As soon as the speed of the wind becomes less than 15 km/h, the generator stops working.
2. There are certain regions where wind is not available, so the use of wind energy is limited to certain places where wind is in plenty and blows most of the time.
3. Wind energy is not sufficient to operate very heavy machines.
4. Wind energy cannot be used to operate all types of machines.
5. Wind mills are usually broken during storms and hence lot of money is spent for the maintenance of a wind energy form.

List any three reasons due to which bio-gas is considered to be an excellent fuel.

Bio-gas is pollution free.

It is cheap as raw material {i.e., cow dung and waste of plants and vegetables) to produce biogas is available free of cost to the farmers.

The remains or used slurry in a bio-gas plant is used as manure by the farmers in the fields to get good yields of crops.

What are the environmental consequences of the increasing demand for energy? What steps would you suggest to reduce energy consumption?

- Industrialization increases the demand for energy. Fossil fuels are easily accessible sources of energy that fulfil this demand.
- The increased use of fossil fuels has a harsh effect on the environment. Too much exploitation of fossil fuels increases the level of greenhouse gas content in the atmosphere, resulting in global warming and a rise in the sea level.
- It is not possible to completely reduce the consumption of fossil fuels. However, some measures can be taken such as using electrical appliances wisely and not wasting electricity.
- Unnecessary usage of water should be avoided. Public transport system with mass transit must be adopted on a large scale. These small steps may help in reducing the consumption of natural resources and conserving them.

1.ACIDS, BASES AND SALTS

Indicators

Indicators are organic compounds that identify the acids and bases by changing colour and smell.
Generally we classify indicators into two types. On the basis of their occurrence.

- Natural indicators
- Synthetic indicators
- Olfactory indicators

Natural indicators.

Naturally occurring substance used as an indicators they are called Natural indicators.
Example:- litmus paper, turmeric, red cabbage, some flowers colour petals.
Litmus paper :

- Litmus solution extracted from lichen belongs to thallophyta division.
  - If it is dipped in "Acidic" media it turns **Blue** litmus to **Red.**
  - If it is dipped in "Basic" media it turns **Red** litmus to **Blue.**

Types of media	**Colour of litmus paper**
Acidic media	**Any litmus paper Red in colour**
Basic media	**Any litmus paper Blue in colour**

b. *Synthetic Indicators* :-

Artificial substance used as a indicators they are called Synthetic indicators.

Example:- Phenolphthaleinindicator :-

Types of media	Colour of Phenolphthalein
Acidic media	**Colourless**
Basic media	**Pink**
Neutral media	**Colourless**

Methyl Orangeindicator :-

Types of media	Colour of Methyl Orange
Acidic media	**Red**
Basic media	**Yellow**
Neutral media	**Orange**

c. Olfactory Indicators:-

The substance whose smell (or odour) changes in acidic or basic solutions are called Olfactory indicators.

Examples:-Onion, vanilla, and clove extract are olfactory indicators.

How do Acids and Bases React with Metals ?

When Acid reacts with Metal it gives Salt and evolution of Hydrogen gas.

Acid + Metal ⟶ Salt + Hydrogen gas

$H_2SO_4 + Zn \longrightarrow ZnSO_4 + H_2$

$H_2SO_4 + Fe \longrightarrow FeSO_4 + H_2$

$2HCl + 2Na \longrightarrow 2NaCl + H_2$

Hydrogen Gas confirmation:

Only hydrogen gas burns making a 'pop' sound if burning candle near a gas filled bubble.

When Base reacts with metal it gives Salt and evolution of Hydrogen gas.

But it is not possible with all metals.

$2NaOH\ (aq) + Zn(s) \longrightarrow Na_2ZnO_2(s) + H_2\ (g)$

(Sodium zincate)

How do Metal Carbonates and Metal Hydrogen Carbonates React with Acids?

When Acid reacts with Metal Carbonate it gives Salt and evolution of Carbon dioxide gas and water.

Acid + Metal Carbonate ⟶ Salt + Carbon dioxide + water

$2HCl + Na_2CO_3 \longrightarrow 2NaCl + CO_2 + H_2O$

Acid + Metal Hydrogen Carbonate. ⟶ Salt + Carbon dioxide + water

$HCl\ (aq) + NaHCO3(s) \longrightarrow NaCl\ (aq) + H_2O(l) + CO_2(g)$

How to confirm carbon dioxide gas

Carbon dioxide gas passed through lime water, we get white precipitate of Calcium Carbonate.

$Ca(OH)_2(aq) + CO_2(g) \longrightarrow CaCO_3(s) + H_2O(l)$

If excess carbon dioxide passed through lime water the formed product calcium carbonate (white ppt) converted into water soluble calcium hydrogen carbonate.

$CaCO_3(s) + CO_2(g) + H_2O(l) \longrightarrow Ca(HCO_3)_2(aq)$

How do Acids and Bases React with each other ?

The reaction between an acid and base to give a salt and water is known as a neutralisation reaction.

Acid + Base ⟶ Salt + Water

$HCl\ (aq) + NaOH\ (aq) \longrightarrow NaCl\ (aq) + H_2O\ (l)$

$HCl\ (aq) + KOH\ (aq) \longrightarrow KCl\ (aq) + H_2O\ (l)$

$H_2SO_4(aq) + 2NaOH\ (aq) \longrightarrow Na_2SO_4\ (aq) + 2H_2O\ (l)$

$H_2SO_4\ (aq) + 2KOH\ (aq) \longrightarrow K_2SO_4\ (aq) + 2H_2O\ (l)$

Reaction of Metallic Oxide with Acids

Metal oxides are basic in nature. & they are basic oxides

The reaction between a Metal oxide and acid to give a salt and water.

Metal Oxide + Acid ⟶ Salt + Water

$CaO\ (s) + 2HCl(aq) \longrightarrow CaCl_2(aq) + H_2O(l)$

$2MgO\ (s) + 2H_2SO_4(aq) \longrightarrow 2MgSO_4(aq) + 2H_2O(l)$

Reaction of Non-Metallic Oxide with Base

Non-Metal oxides are acidic in nature. & they are acidic oxides

The reaction between a Non-Metal oxide and base to give a salt and water.

Non-Metal Oxide + Base ⟶ Salt + Water

$CO_2\ (g) + Ca(OH)_2(aq) \longrightarrow CaCO_3(aq) + H_2O$

What Do All Acids and All Bases Have in Common?

A common thing in all the acids is that they produce hydrogen ions (H^+ions) when dissolved in water.

When Sulphuric acid added to water to produce Hydrogen ion (H^+) and Sulphate ion(SO_4^{-2})

$H_2SO_4(aq) \longrightarrow 2H^+(aq) + SO_4^{-2}(aq)$

Alkalis :

Bases which are soluble in water are called alkalis.

They are soapy to touch, bitter and corrosive.

$NaOH\ (aq) \longrightarrow Na^+\ (aq) + OH^-\ (aq)$

$KOH\ (aq) \longrightarrow K^+\ (aq) + OH\text{-}\ (aq)$

Neutralization Reaction: the reaction in which acids reacts with bases to produce salt and water.

Acid + Base ⟶ Salt + Water

HX + MOH ⟶ MX + HOH

$H^+(aq) + OH^-(aq) \longrightarrow H_2O(l)$

$HCl + NaOH \longrightarrow NaCl + H_2O$

$HCl + KOH \longrightarrow KCl + H_2O$

what happens when acid added to the water?

The process of dissolving an acid or a base in water is a highly exothermic one.

The acid must always be added slowly to water with constant stirring. If water is added to a concentrated acid the heat generated may cause the mixture to splash out and cause burns.

Strong Acids (Degree of ionisation)

An acid which is completely ionised in water and produce large amount of hydrogen ions.

$HCl\ (aq) \longrightarrow H^+(aq) + Cl^-(aq)$

(100 HCl molecules) (approx. 95 to 100 H^+ ions)

Weak Acids

An acid which is partially ionised in water and produce small amount of hydrogen ions.

$CH_3COOH\ (aq) \longrightarrow H^+(aq) + CH_3COO^-(aq)$

(100 HCl molecules) (approx. 20 to 30 H^+ ions)

Concentrated Acids or Base

Acid or Base which contains minimum possible amount of water (solvent) in it.

Dilute Acids or Base

Acid which contains much more of water (solvent) in it.

Dilution:-Mixing an acid or base with water results in decrease in the concentration (number) of ions per unit volume, such process is called dilution. And acid or base is said to be diluted.

pH Scale

A scale for measuring hydrogen ion concentration in a solution, called pH scale.

Solution	pH	Nature	Solution	pH	Nature
Saliva(before meal)	7.4	Basic	Tap water(pure)	7	Neutral
Saliva(after meal)	5.8	Acidic	1M NaOH	14	Basic
Lemon juice	2.5	Acidic	1M HCl	1	Acidic
Aerated drink	6	Acidic	Milk	6.5	Acidic
Carrot juice	10-14	Basic	Blood	7.4	Basic
Coffee	5	Acidic	Toothpaste	8	Basic
Tomato juice	4.1	Acidic	Gastric juice	1.4	Acidic

Importance of pH in Everyday Life

1. **Plants and Animals are Sensitive to pH changes.** pH of acid rain is less than 5.6 it is called acid rain.

   Acid rain flow into rivers, lower the pH of river water. It harms the survival of aquatic animals

2. What is the pH of the soil in your backyard?

Most of the plant grows healthy when pH of the soil is close to 7.

If the soil is too acidic or too basic plant growth will be decrease. Then test the soil,

Treatment:-

If the soil is acidic **add lime** to soil.

If the soil is basic **add manure or compost** to soil.

3. pH in our digestive system.

In our stomach **gastric juice (hydrochloric acid)** helps in digesting our food without harming.

During indigestion the stomach produces too much acid and causes pain and irritation.

Treatment:-

To cure pain and irritation suggested to take antacids neutralise excess acid produced in stomach.

Example: -milk of magnesia, Baking soda.

4. pH change as the cause of tooth decay.

Food particles remaining in the mouth after eating degraded by bacteria and produce acids, which decrease pH of mouth less than 5.5.But corroded when the pH in the mouth is below 5.5, create tooth decay.

Prevention:-

Prevent by cleaning mouth after eating food by using **toothpastes** (basic in nature).

5. **Self-defence by animals and plants through chemical warfare.**

Insects:

When honey bee stings a person, it injects an acidic liquid into skin which causes immense pain and irritation.

Treatment:-

Use of a mild base like **baking soda** on the stung area gives relief.

Plants:

Sting hair of nettle leaves inject **methanoic acids** causing burning pain.Secretion of methanoic acid.

Treatment:-

Pain will be cured by rubbing the area with **dock plant** leaves.

Natural Source	Acid	Natural Source	Acid
Vinegar	Acetic acid	Sour milk	Lactic acid
Orange	Citric acid	Lemon	Citric acid
Tamarind	Tartaric acid	Ant Sting	Methanoic acid
Tomato	Oxalic acid	Nettle Sting	Methanoic acid

2. Metals And Non-Metals

PHYSICAL PROPERTIES OF METALS

Properties	Definition	Examples
Metallic lustre	Pure state of metal has a shining surface. This property is called metallic lustre	coins
Metals are hard	All metals are hard. But alkalis are soft it can be cut by knife. Such as Sodium, potassium.	making steel bridges, vehicles axle
Malleability	Metals can be beaten into thin sheets. This property is called malleability.	plates, coins, sheets
Ductility	Metals can be drawn into thin wires. This property is called Ductility.	wires, nails, bars, railway tracks.
Thermal good conductor	Metals allow heat to pass through them easily, This property is called Thermal good conductor	Cooking utensils, Iron Box Coil.
Electrical good conductor	Metals allow electricity (or electric current) to pass through them easily, this property is called Electrical good conductor.	electrical wire.
Sonorous:	Metals capable of producing sound. This property is called Sonorous	making bells .

PHYSICAL PROPERTIES OF NON – METALS

Properties	Definition
Non - lustre	Non - metals does not has a shining surface.
Non-Malleability	Non-Metals cannot beaten into thin sheets.
Non-Ductility	Non-Metals cannot drawn into thin wires.
Thermal bad conductor	Non-Metals does not allow heat to pass through them
Electrical bad conductor	Non-Metals does not allow electricity (or electric current) to pass Through them.
Non - Sonorous	Non-Metals cannot produce sound

Difference between Metals and Non – Metals

Metals	Non – Metals
Metallic lustre	Non- lustre
Malleability	Non-Malleability
Ductility	Non-Ductility
Thermal good conductor	Thermal bad conductor
Electrical good conductor	Electrical bad conductor
Sonorous	Non-Sonorous

Exception in physical properties

Metals/Non-Metals	Exceptional property
Iodine	It is lustrous Non-metal.
Mercury	Liquid metal
gallium and caesium	Low Boiling and Melting point Metals
Lithium, Sodium , potassium (all alkali Metals)	Soft Metals and Low density Metal
Diamond	Hardest natural substance.
Graphite (allotrope of Carbon)	Non-Metal with a good conductor of electricity.

Chemical properties of metals:

What happens when metals are burnt in air.

Metal + Oxygen (air) ⟶ Metal Oxide

$4Na\ (s) + O_2\ (g) \longrightarrow 2Na_2O$

$4Al\ (s) + 3O_2\ (g) \longrightarrow 2Al_2O_3(s)$

$2Zn(s) + O_2(g) \longrightarrow 2ZnO(s)$

$2Pb(s) + O_2(g) \longrightarrow 2PbO(s)$

$2Mg(s) + O_2(g) \longrightarrow 2MgO(s)$

AMPHOTERIC OXIDE: -

Some metal oxides, such as aluminium oxide, zinc oxide, etc., which react with both acids as well as bases to produce salts and water are known as amphoteric oxides.

For Example: - $Al_2O_3 + 6HCl \rightarrow 2AlCl_3 + 3H_2O$

$Al_2O_3 + 2NaOH \rightarrow 2NaAlO_2 + H_2O$

Reaction with water:

All metals do not react with water. Those which react form metal oxide and hydrogen gas. Metal oxides that are soluble in water further form metal hydroxide.

Metal + Water ⟶ Metal oxide + Hydrogen

Metal oxide + Water ⟶ Metal hydroxide

$2K_{(s)} + 2H_2O_{(l)} \longrightarrow 2KOH_{(aq)} + H_{2(g)}$ + heat energy

$Ca_{(s)} + 2H_2O_{(l)} \longrightarrow Ca(OH)_{2(aq)} + H_{2(g)}$

$3Fe_{(s)} + 4H_2O_{(g)} \longrightarrow Fe3O4(s) + 4H_{2(g)}$

Reaction with Dilute Acid:

Most metals react with acids to give a salt and hydrogen gas.

Metal + dilute acid ⟶ Salt + Hydrogen

Hydrogen gas is not evolved when a metal reacts with nitric acid. It's a strong oxidizing agent and oxidizes hydrogen produced to water and itself gets reduced to any of the nitrogen oxides (N2O, NO, NO2).

But magnesium (Mg) and manganese (Mn) react with very dilute HNO_3 to evolve H2 gas.

Aquaregia:

Freshly prepared mixture of concentrated hydrochloric acid and concentrated nitric acid in the ratio of 3:1.

Reaction of metals with solution of other metal salts:

Reactive metals can displace less reactive metals from their compounds in solution or molten form.

Metal A + Salt Solution of Metal B ⟶ Salt Solution of Metal B + Metal B

Fe(s) + CuSO4(aq) ⟶ FeSO4(aq) + Cu(s)

Zn(s) + CuSO4(aq) ⟶ ZnSO4(aq) + Cu(s)

Pb(s) + CuCl2(aq) ⟶ PbCl2(aq) + Cu(s)

How do metals and non-metals react:

The compounds formed by the transfer of electrons from a metal to a non-metal are known as ionic or electrovalent compounds.

Properties of ionic compound:

Properties	Explanation
Physical Nature	Solid and hard due to strong inter-ionic force of attraction; generally Brittle.
Melting and boiling points	High melting and boiling points since a considerable force is required to Break the strong inter-ionic attraction.
Solubility	Generally soluble in water but insoluble in solvents such as kerosene, petrol, etc.
Conduction of electricity	✓ Conducts electricity through solution due to involvement of charged particles (ions). ✓ As movement of ions is not possible in solid state, due to rigid structure, do not conduct electricity. ✓ In molten state this movement is overcome due to heat and thus conducts electricity.

Occurrence of Metals:

Terms	Definitions
Mineral	**The elements or compounds, which occur naturally in the Earth's crust.**
Ore	**Mineral that contains high percentage of metal that can be Extracted profitably from it.**
Gangue	**Ores mined from earth contain large amount of impurities such as sand, soil, etc. called gangue.**

Extraction of Metal:

a) Extraction of metals low in the Activity Series:

These metals are generally very unreactive.

Oxides of these can be reduced to metals by heating alone.

For Example:-

$2HgS(s) + 3O2\ (g) + Heat \longrightarrow 2HgO(s) + 2SO2\ (g)$

b) Extraction of Metals in the middle of the Activity Series:

It's easy to obtain a metal from its oxide compared to its sulphide and carbonate.

Roasting	Calcination
Roasting is a process of converting sulphide ores into oxides by heating strongly in the Presence of excess air.	**Calcium is a process of converting carbonate ores into oxides by heating strongly in limited air.**
$\mathbf{2ZnS_{(s)} + 3O_{2(g)} \longrightarrow 2ZnO_{(s)} + 2SO_{2(g)}}$	$\mathbf{ZnCO3_{(s)} \longrightarrow ZnO_{(s)} + CO_{2(g)}}$

Thermit reaction:

Reaction of iron oxide with aluminium used to join railway tracks or cracked machine parts.

$\mathbf{Fe_2O_3(s) + 2Al(s) \longrightarrow 2Fe\ (l) + Al_2O_3(s) + Heat}$

C) Extraction of metals high in the Activity Series:

- ✓ Since these are very reactive metals and thus cannot be obtained by displacement reactions. These metals are obtained by electrolytic refining.
- ✓ They are generally obtained by electrolysis of their molten chlorides. Metals are deposited at cathode (negatively charged), while chlorine is liberated at anode.

At cathode: - $Na^+ + e^- \longrightarrow Na$

At Anode: - $2Cl^- \longrightarrow Cl_2 + 2e^-$

✓ Aluminium is obtained by electrolytic reduction of aluminium oxide.

Electrolytic Refining:

✓ Metals obtained by various reduction processes contain impurities. The most widely used method for refining impure metals is electrolytic refining.

✓ Apparatus setup:

At Anode – Impure Metal

At Cathode – Pure Metal

Electrolyte – Solution of the metal salt

✓ At Anode: Pure metal from anode dissolve into electrolyte.

✓ At Cathode: An equivalent amount of pure metal from electrolyte is deposited at cathode.

✓ Soluble impurities go into solution; insoluble impurities settle at the bottom of anode called as anode mud.

Corrosion:

The eating up of metal by the action of gases, moisture or acids present in air is called Corrosion.

Prevention of corrosion of Iron:

i. **Painting**
ii. **Applying grease**
iii. **Galvanisation: Process of protecting steel and iron from rusting by coating them with thin layer of zinc.**
iv. **Chromium plating/ tin plating**
v. **Alloying: Improve the properties of a metal.**

Alloy: -

Alloy is a homogeneous mixture of a metal and two or more other metals or non-metals.

✓ It is prepared by melting primary metal first and then dissolving other in definite proportion and then Cooling to room temperature.

Alloy	Composition	Properties	Uses
Steel	99% Iron and 1% Carbon	Hard and Strong	Construction of building, bridges and railway tracks.
Stainless Steel	Iron, Nickel, and Cobalt.	Shiny, hard , Strong and does not rust	Cooking utensils, surgical instruments.
Brass	Copper and Zinc	More malleable and more stronger than pure copper	Cooking utensils, Musical instruments.
Bronze	Copper and Tin	Shiny, hard , Strong and does not rust	Making statue, coins, and medals.
Solder	Lead and Tin	Low melting point	Welding electrical wire together.
Amalgam	Any alloy of mercury with one or more other metals is called Amalgam		Dentists for fillings in teeth.
Alloy of Gold	gold and silver or gold and copper	Harder than Pure Gold	Making Gold ornaments.

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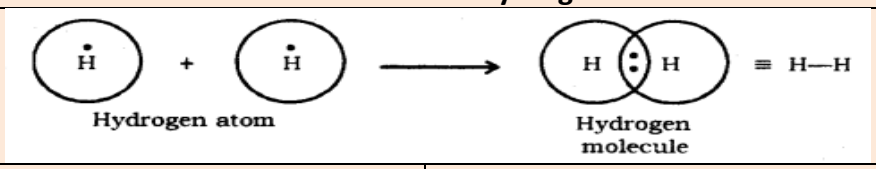
3.CARBON AND ITS COMPOUNDS

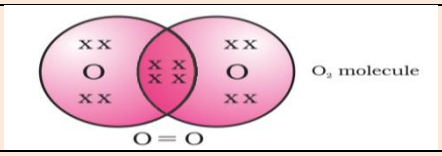
Electron Dot Structure:

The electron dot structures provide a picture of bonding in molecules in terms of the shared pairs of electrons and octet rule.

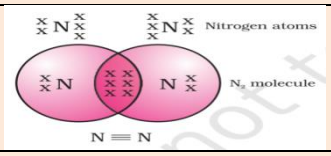
Electron dot structure of Hydrogen Molecule



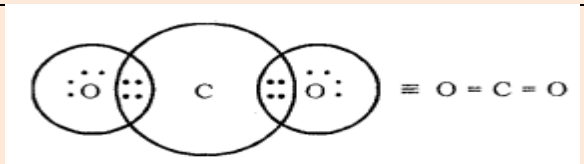
Electron dot structure of Oxygen Molecule.



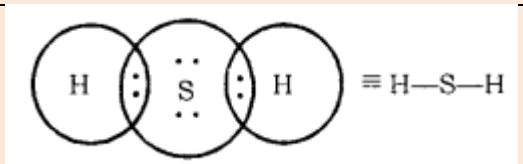
Electron dot structure Nitrogen Molecule.

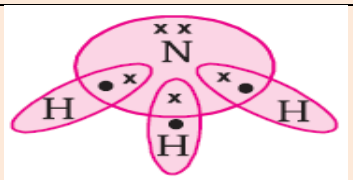
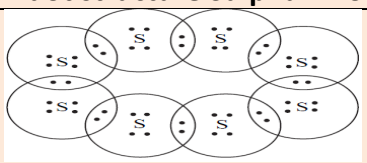
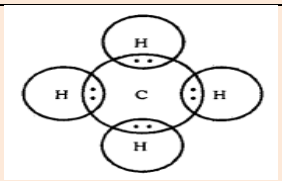
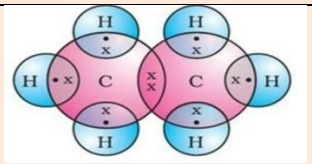
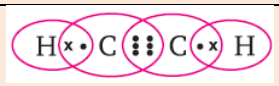
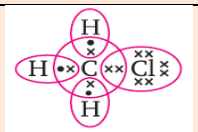
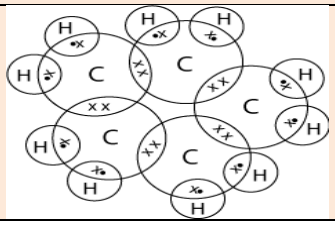
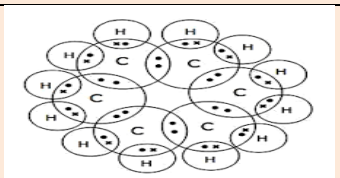


Electron dot structure Carbon dioxide Molecule.



Electron dot structure Hydrogen Sulphide Molecule.



Electron dot structure Ammonia Molecule.	Electron dot structure Sulphur Molecule.
	
Electron dot structure Methane Molecule.	**Electron dot structure Ethane Molecule.**
	
Electron dot structure Ethyne Molecule.	**Electron dot structure Methyl chloride Molecule.**
	
Electron dot structure Cyclo pentane Molecule.	**Electron dot structure Cyclo hexane Molecule.**
	

Allotropy: -

The phenomenon in which the element exists in two or more different physical states with similar chemical properties are called Allotropy.

✓ **Carbon has Three Main Allotropes:-**They are Diamond, Graphite, Buckminster Fullerene.

Catenation:

The self linking property of an element mainly carbon atom through covalent bonds to form long straight, branched and rings of different sizes are called Catenation.

Tetravalent Nature:

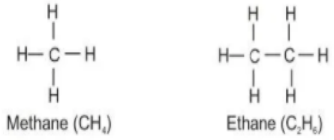
Carbon has valency of four. It is capable of bonding with four other atoms of carbon or some other heteroatoms with single covalent bond as well as double or triple bond.

Saturated Hydrocarbon (Alkanes):

The saturated hydrocarbons are hydrocarbons in which carbon atoms are linked together by single bonds only

- General formula is CnH2n+2.
- n = number of carbon atoms.
- In this, the carbon atoms are connected by only a single bond.

For example:

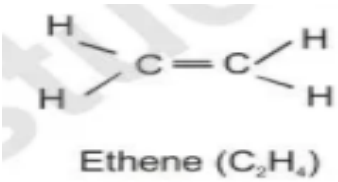


Unsaturated Hydrocarbons

The hydrocarbons containing multiple bonds between two carbon atoms are called Unsaturated Hydrocarbons. Unsaturated hydrocarbons can be further divided into two categories

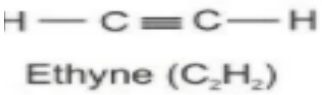
i) Alkenes:

General formula is CnH2n, where n = number of carbon atoms.
In this, the two carbon atoms are connected by double bond.
For example:



ii)Alkynes

- General formula is CnH2n-2, where n = number of carbon atom
- In this, the two carbon atoms are connected by triple bond.
For example:



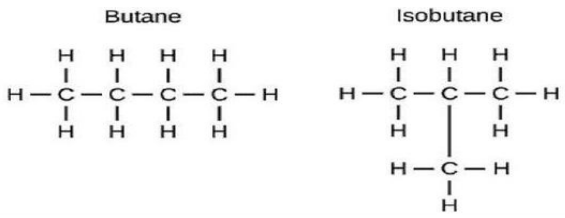
Isomerism: Two or more Compounds having the same molecular formula but differ in properties (chemical and physical) are known as Isomers and this phenomenon is known as Isomerism.

Structural Isomerism:

Two or more Compounds having the same molecular formula but differ structural arrengement are called

Structural isomers.

ForExample: Isomers of butane (C4H10)



Homologous Series:

Series of organic compounds having the same functional group and chemical properties and successive members differ by a CH2 unit or 14 mass units are known as Homologous series.

Number of Carbon	Homologous series of Alkanes		Homologous series of Alkenes		Homologous series of Alkynes	
1	Methane	CH_4				
2	Ethane	C_2H_6	Ethene	C2H4	Ethyne	C2H2
3	Propane	C_3H_8	Propene	C3H6	Propyne	C3H4
4	Butane	C4H10	Butene	C4H8	Butyne	C4H6
5	Pentane	C5H12	Pentene	C5H10	Pentyne	C5H8

Characteristic of Homologous Series

- The successive members in homologous series differ by CH2 unit or 14 mass unit.
- Members of given homologous series have the same functional group.
- All the members of homologous series shows similar chemical properties.

Functional Group:

An atom or group of atoms present in a molecule which largely determines its chemical properties are called Functional Group.

For Example : Alcohol (-OH), Aldehyde (-CHO), Ketone (-CO-), Carboxylic acid (-COOH).

Chemical Properties of Carbon Compounds:

1. Combustion:

The complete combustion of carbon compounds in the air gives carbon dioxide water, heat and light.

$CH_3CH_2OH(l) + O_2(g) \longrightarrow CO_2(g) + H_2O(l) + \text{Heat and light}$

$C(s) + O_2(g) \longrightarrow CO_2(g) + \text{Heat and light}$

$CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(l) + \text{Heat and light}$

saturated hydrocarbon forms a sooty flame.

Unsaturated hydrocarbons burn with a yellow smoky flame.

2. Oxidation:

Oxidation of ethanol in presence of oxidizing agents gives ethanoic acid.

$$\underset{\text{Alcohol}}{CH_3 - CH_2OH} \xrightarrow[\text{acidified } K_2Cr_2O_7]{\text{alk. } KMnO_4 + \text{heat}} \underset{\text{Carboxylic acid}}{CH_3COOH}$$

Oxidizing Agent:

Some substances are capable of adding oxygen to others, are known as Oxidising Agent.

For Example: Alkaline $KMnO_4$

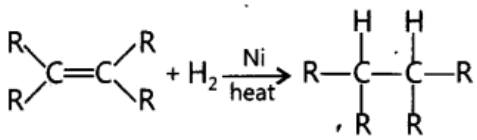
Acidified $K_2Cr_2O_7$

3. Addition Reaction:

Addition of dihydrogen with unsaturated hydrocarbon in the presence of catalysts such as nickel or platinum or palladium are known as Hydrogenation (addition) reaction.

For Example:-

Process of converting vegetable oil into solid fat (vegetable ghee) is called Hydrogenation of Oil.



4. Substitution Reaction:

Replacement of one or more hydrogen atom of an organic molecule by another atom or group of the atom is known as Substitution Reaction.

For Example :-

in the presence of sunlight chlorine replaces hydrogen atom by one from methane.

Methane + Chlorine → Chloromethane + Hydrogen chloride

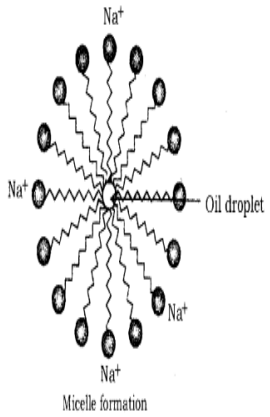
$CH4 + Cl_2 \longrightarrow CH_3Cl + HCl$

Soap:A soap is the sodium or potassium salt of a long chain carboxylic acid, which has cleansing property in water.**For Example**: - Sodium stearate ($C_{17}H_{35}COO^-Na^+$)

Detergent: Any substance which has cleansing action in water is called detergent.

Cleansing Action of Soap:

- When a cloth with dirt attached to it is immersed in water containing soap, then the hydrocarbon chain (hydrophobic end) is attached to the dirt particle whereas the ionic end (hydrophilic end) points outward, towards water.
- So the dirt particles are surrounded by the soap molecules forming a micelle.
- This micelle gets attached with water molecules through the ionic end and is washed away along with the dirt panicles.



Micelle formation

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4. CLASSIFICATION OF ELEMENTS

Dobereiner's TriadsStatement: -"When elements are arranged in increasing order of atomic masses; the atomic mass of the middle element of the triad is equal to the average atomic mass of the other two elements

Set I		Set II		Set-III	
Element	Atomic mass	Element	Atomic mass	Element	Atomic mass
Calcium	40	Lithium	7	Chlorine	35.5
Strontium	87.5	Sodium	23	Bromine	80
Barium	137	Potassium	39	Iodine	127
Average of the atomic masses of calcium and barium $=\frac{40+137}{2}=88.5$		Average of the atomic masses of lithium and potassium $=\frac{7+39}{2}=23$		Average of the atomic masses of chlorine and iodine $=\frac{35.5+127}{2}=81.2$	
Atomic mass of strontium = 87.5		Atomic mass of sodium = 23		Atomic mass of bromine = 80	

Limitations of Dobereiner Law of Triads

* He is failed to arrange All the then known elements in the form of triads having similar chemical properties .

*He is able to identified only three triads from the elements known at that time.

Newland's Law of Octaves

Statement: - when elements are placed in order of increasing atomic masses, the physical and chemical properties of every 8th element are similar to that of the first element.

Limitations of Newland's Law of Octaves

1. Newland's Law of Octaves was applicable only upto calcium, as after calcium every eighth element did not possess properties similar to that of the first.

2. Properties of the elements which were discovered later did not fit into the Law of Octaves.

3. In a few cases, Newlands adjusted two elements in the same slot to fit them in his table.

4. He also grouped unlike elements under the same slot.

Mendeleev's Periodic Table

The physical and chemical properties of the elements are the periodic functions of their atomic masses.

Achievements of Mendeleev's Periodic

1. This table had gaps to give place for some undiscovered elements.

2. There was a zero group in the table to accommodate the noble gases.

3. It corrected the atomic masses of certain elements.

For example, the atomic mass of beryllium was corrected from 13.5 to 9.

Limitation of Mendeleev's Periodic Table

1. No fixed position could be given to hydrogen in this Table.2. It did not explained the position of isotopes.
3. In a few cases the trend of increasing atomic masses was not followed. For example, Cobalt (Co) has higher atomic weights but was placed before Nickel (Ni) in the periodic table.

Modern periodic table

Statement: -"The physical and chemical properties of elements are the periodic function of their atomic numbers."

- ✓ **18 vertical columns called groups** and **7 horizontal rows called periods**.
- ✓ Group 1 elements are known as alkali metals.
- ✓ Group 2 elements are known as alkaline earth metals.
- ✓ Group 17 elements are known as halogens.
- ✓ Group 18 elements are known as noble gases.

Advantages of Modern Periodic Table

(a) Position of hydrogen is fixed as it is kept in the group with the elements of same valence electrons.

(b) In the Modern Periodic table elements are arranged in the increasing order of their atomic number, so there was no need to place more than one elements in one slot.

(c) The atomic numbers of cobalt and nickel are 27 and 28 respectively. Hence, cobalt with a lower atomic number is placed before nickel in the modern periodic table.

(d) All isotopes of an element have same atomic number but different atomic masses. Therefore, all the isotopes are placed in the same position in the modern periodic table.

Trends in the Modern Periodic Table

Valency:

The valency of an element is determined by the number of valence electrons present in the outermost shell of its atom

Along the Period :- On moving from left to right in a period, the valency first increases from 1 to 4 and then decreases to 0.

Down the Group :- On moving from top to bottom in a group, the valency remains same because the number of valence electrons remains the same.

Atomic size:

Atomic size is determined by the distance between the centre of the nucleus and the outermost shell of an isolated atom.

Along the Period :- On moving from left to right in a period, the atomic size decreases due to the increased effective nuclear charge that pulls the valence electrons closer to the nucleus..

Down the Group :- On moving from top to bottom in a group, the atomic size increases due to the addition of an extra shell at each step.

Metallic character:

It is determined by the tendency of an atom to lose its outermost (valence) electrons.

- **Along the Period** :- On moving from left to right in a period, metallic character of elements decreases because due to the increase in nuclear charge the tendency to lose valence electrons decreases.
- **Down the Group** :- On moving from top to bottom in a group, metallic character of elements increases due to the increase in atomic size that makes it easy to lose the valence electrons.

Non-metallic character:

It is determined by the tendency of an atom to gain electrons.

- **Along the Period** :- On moving from left to right in a period, non-metallic character of elements increases because due to the increase in nuclear charge the tendency to gain the electrons increases.
- **Down the Group** :- On moving from top to bottom in a group, non-metallic character of elements decreases because due to the increase in atomic size the nuclear pull decreases. Due to this the tendency to gain the electrons decreases.

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BIOLOGY PASSING PACKAGE

1. LIFE PROCESSES

1. How are the functions of arteries, veins and capillaries are interrelated in the circulation of blood?

- Arteries carry blood away from the heart to various organs of the body. On reaching an organ or tissue, the artery divides into smaller and smaller vessels to bring the blood in contact with all the individual cells.
- Exchange of material between the blood and surrounding takes place across the thin wall of smallest vessels, the capillaries. The capillaries then join together to form veins
- Veins convey the blood away from the organ or tissue. Veins collect the blood from different organs and bring it back to the heart

2.How does transportation of water takes place over the heights in a plant?

- At the roots , cells in contact with the soil actively take up ions. This creates a difference in the concentration of these ions between the root and the soil
- Water moves into the root from the soil to eliminate this difference. There is a steady movement of water into root xylem, creating a column of water that is steadily pushed upwards.
- Evaporation of water molecules from the stomata of leaves due to transportation creates s suction which pulls water from xylem cells of root.

3. "The body temperature of frogs and lizards depend on temperature in the environment" justify.

- Both frogs and lizards have three chambered heart**.**
- Oxygenated and deoxygenated blood mix in the heart
- Production of energy became slightly less. This energy cannot be used for maintaining constant temperature.

4. Explain the process of translocation of food materials in plants

- Translocation of food materials occurs in the phloem tissue of plants.
- This process takes place in the sieve tubes with the help of adjacent companion cells both in upward and downward directions.
- This process is achieved by osmotic pressure.

5. What are the methods used by plants to get id of excretory products?

- Plants get rid of excess of water by transpiration.
- Waste products are stored in cellular vacuole
- Waste products maybe stored in leaves that fall off.
- Resins and gums are stored in old xylem.
- Some waste substances excreted into the soil from roots.

6. What are the differences between the transport of materials in xylem and phloem?

Xylem	Phloem
Xylem tissue helps in the transport of water and minerals.	Phloem tissue helps in the transport of food.
Water is transported upwards from roots to all other plant parts.	Food is transported in both upward and downward directions.
Transport in xylem occurs with the help of simple physical forces such as transpiration pull.	Transport of food in phloem requires energy in the form of ATP.

7. **Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds?**

Answer Helps to maintains body temperature.

Ensures efficient Supply of oxygen to the body.

8. Describe double circulation in human beings. Why is it necessary?

- During a single cycle blood goes twice in the heart which is known as double circulation.
- It is necessary in human being to separate oxygenated and de-oxygenated blood because this makes their circulatory system is more efficient and helps in maintaining constant body temperature.

9. **In mammals and birds why is it necessary to separate oxygenated and de-oxygenated blood ?**

Mammals and birds are warm blooded animals.

- This means they can control their body temperature and do not have to depend on environment for their body temperature regulation.
- Because of this birds and mammals require optimum oxidization of glucose which would be possible with good supply of oxygen.
- So it is required to have separate oxygenated and de-oxygenated blood to supply the required amount of oxygen

10. a) Arteries have thick walls while veins have valves. Explain.
(b) Why are valves needed in the heart?
(c) Leakage of blood from vessels reduces the efficiency of pumping system. How is the leakage prevented ?

(a) In arteries, blood flows under pressure so that their walls are thick and elastic. In veins the blood is Therefore, their walls are thin. Rather, they possess semilunar valves to check back flow of blood.
(b) Valves are needed in the heart to direct the flow of blood in a particular direction.
(c) Leakage of blood from injured blood vessels is prevented by first clotting of blood at the site of injury. This seals the place of injury. Later on, the area of leakage is healed up.

11. What is lymph ? How is composition of lymph different from blood plasma ? What is the direction of its flow ?List two functions of lymphatic system

Lymph: It is a colourless or slightly yellowish viscous fluid which is derived from tissue fluid and is present inside Special tubes called lymph vessels.

12. Difference Between Lymph and Blood Plasma

Blood	Lymph
• Blood is connective tissue which is fluid in nature. • Solid components of blood **(Blood corpuscles)**: • RBC (Red blood cells): It carries O_2 and CO_2 and also containsHemoglobin which impart red colour to the blood. • WBC (White blood cells): It provides body defence by engulfing the germs and produces antibodies. • Blood Platelets: It helps in blood clotting during injury. • → Liquid components **(Plasma)**: It is a yellow colour fluid which contain 90% water & 10% organic substances.	• It is a yellowish fluid which escapes from the blood capillaries into the intercellular spaces. • It contains less proteins than blood. • It flows from the tissues to the heart which helps in transportation and destroying germs. • It carries digested and absorbed fat from intestine and drains excess fluid from extra cellular space back into the blood. • Direction of Flow: Lymph flows from tissues to subclavian veins—It is unidirectional. • Functions of Lymphatic System: Lymph functions as a middleman that exchanges materials between blood and tissue fluid.

13. Write two points of difference between pulmonary artery and pulmonary vein.

Pulmonary artery	Pulmonary vein
1. Distance. It operates through short distance. 2. Flow. It is from heart to lungs and back. 3. Pumping. Blood is pumped by right ventricle and received by left auricle. „ 4. Oxygenation-Deoxygenation. Deoxygenated blood is pumped into lungs. Oxygenated blood is received from lungs.	1. It operates through long distance. 2. It is from heart to body parts (other than lungs) and back. 3. Blood is pumped by left ventricle and received by right auricle. 4. Oxygenated blood is pumped into different body parts (other than lungs). Deoxygenated blood is received from body organs.

2. CONTROL AND COORDINATION

1. What happens at the synapse between two neurons?

- The synapse is the tiny gap (not seen by naked eyes) between two adjacent neurons.
- This information, acquired at the end of the dendritic tip of a nerve cell sets off a chemical reaction that creates an electrical impulse.
- This impulse travels from the dendrite to the cell body, and then along the axon to its end.
- At the end of the axon, the electrical impulse sets off the release of some chemicals.
- These chemicals cross the gap, or synapse, and start a similar electrical impulse in a dendrite of the next neuron. This is the process how nervous impulses travel in the body.
- Similar synapse finally allows delivery of such impulses from neurons to other cells, such as muscles cells or gland.

2. What are plant hormones?

The chemical substances produced in plants which control growth, development and responses in plants, are called plants plant hormones.

For example: Auxins, Gibberellins, Cytokinins and Abscisic acid.

3. Why is the use of iodised salt advisable?

- Iodine is necessary for the thyroid gland to make thyroxin hormone.
- Thyroxin regulates carbohydrate, protein and fat, metabolism in the body so as to provide the best balance for growth.
- Iodine is essential for the synthesis of thyroxin. In case iodine is deficient in our diet, there is a possibility that we might suffer from goitre.
- One of the symptoms in this disease is a swollen neck.

4. How does our body respond when adrenaline is secreted into the blood?

- Adrenaline is secreted directly into the blood and carried to different parts of the body.
- The target organs or the specific tissues on which it acts include the heart. As a result, the heart beats faster, resulting in supply of more oxygen to our muscles.
- The blood to the digestive system and skin is reduced due to contraction of muscles around small arteries in these organs.
- This diverts the blood to our skeletal muscles. The breathing rate also increases because of the contractions of the diaphragm and the rib muscles.
- All these responses together enable the animal body to be ready to deal with the situation. Such animal hormones are part of the endocrine system which constitutes a second way of control and coordination in our body.

5. Why are some patients of diabetes treated by giving injections of insulin?

- Diabetes patients as a treatment, they might be taking injections of insulin.
- This is a hormone which is produced by the pancreas and helps in regulating blood sugar levels.
- If it is not secreted in proper amounts, the sugar level in the blood rises causing many harmful effects.

6. explain the parts of neuron and its function.

A neurons consists of three parts;

(i) Cell body: It is a typical animal cell which contains cytoplasm and a nucleus.

(ii) Dendrites: A number of long and thin fibrescomes out from the cell body of the neurons, they are nerve fibre. The shorter fibres on the cell body of neurons are called dendrites.

(iii) Axon: The longest fibre on the cell body of neurons is called axon. It has an insulating and protective sheath (or cover)of myelin around it.

Function:

- The information, acquired at the end of the dendritic tip of a nerve cell, sets off a chemical reaction that creates an electrical impulse.
- This impulse travels from the dendrite to the cell body, and then along the axon to its end. At the end of the axon, the electrical impulse sets off the release of some chemicals.
- These chemicals cross the gap, or synapse, and start a similar electrical impulse in a dendrite of the next neuron. This is a general scheme of how nervous impulses travel in the body.
- A similar synapse finally allows delivery of such impulses from neurons to other cells, such as muscles cells or gland.
- It is thus no surprise that nervous tissue is made up of an organised network of nerve cells or neurons, and is specialised for conducting information via electrical impulses from one part of the body to another.

7. A persons face has become pale and his breathing rate has increased due to fear. Analyse the process which enables the person to deal with this situation.

- Adrenaline is directly secreted into the blood. the blood to the skin is reduced to the contraction of muscles around small arteries
- The breathing rate increases because of the contractions of the diaphragm and the rib muscles. The heart beats faster, resulting in supply of more oxygen to the muscles.

8.Name the given structure(reflex arc) . what is its general function ? mention the function of the parts labelled as A and B .these structures in animals are said to be efficient ways to give quick responses.why?

- Reflex arc
- It gives sudden action in response to the event happening in the environment.

A) Sensory neuron : it conducts the impulse of stimulus from receptor to the spinal cord

B) Effector: which shows the sudden visible response.

- Reflex arcs have evolved in animals because the thinking process of brain is not fest enough in many animals.
- meanwhile many animals have very little of the complex neuron network needed for thinking.
- so it can function in the absence of true though process and increase the chance of survival.

9.Explain the function of auxin hormone

- When growing plants detects light , auxine is synthesized at the shoot tip and it helps the cells to grow longer.
- When light is coming from one side of the plant , auxin diffuses towards the shady side of the shoot .
- this concentration of auxin stimulates the cells to grow longer on the side of the shoot which is away from the light.

10. Imagine the following situations:

(i) Clapping at the end of the programme

(ii) Fluctuating blood pressure in the body.How these situations are functionally different? Give reason

(i) voluntary action

- Based on deciding what to do next(action performed based on thinking)
- Controlled by forebrain

(ii)Involuntary action

- Action without thinking control
- Controlled by hindbrain

11. "We withdraw our leg when stepped on thorn unknowingly"

(a) Trace the sequences of events which occur in this action

(b) Which part of human nervous system controls this action?

(a)

- Receptors receive the stimulus of the pain
- Message reach spinal cord through sensory neuron.
- Responses reach motor neuron through association neuron
- Responses reach effector through motor neuron.
- Muscle withdraw the leg

(b) Spinal cord

12. Mention the important parts and their functions of Human brain

Answer: Some main structures of the human brain are explained below.

Cerebrum: The cerebrum is the largest part in the human brain. It is divided into two hemispheres; called cerebral hemispheres.

Functions of cerebrum:

- The cerebrum controls the voluntary motor actions.
- It is the site of sensory perceptions; like tactile and auditory perceptions.
- It is the seat of learning and memory.

Hypothalamus:

- The hypothalamus lies at the base of the cerebrum. It controls sleep and wake cycle (circadian rhythm) of the body.
- It also controls the urges for eating and drinking.

Cerebellum:

- Cerebellum lies below the cerebrum and at the back of the whole structure.
- It coordinates the motor functions. When you are riding your bicycle; the perfect coordination between your pedaling and steering control is achieved by the cerebellum.

Medulla:

- Medulla forms the brain stem; along with the pons. It lies at the base of the brain and continues into the spinal cord.
- Medulla controls various involuntary functions; like hear beat, respiration, etc.

13.What is Reflex Action and reflex arc?

→ Reflex action is quick, sudden and immediate response of the body to a stimulus.
Example: Knee jerk, withdrawal of hand on touching hot object.

→ Reflex arc:

The pathway through which nerve impulses pass during reflex action is called reflex arc.

14. Write the differences between exocrine and endocrine glands

Exocrine glands	Endocrine glands
A gland which secretes its product into a duct or tube is called exocrine gland.	A gland which does not have a duct & secretes its product directly into blood stream is called endocrine gland.
Eg. Salivary gland secretes saliva into a duct called salivary duct.	Eg. Pituitary gland, thyroid gland.

15 .write the different glands, their location, hormone, function and deficiency diseases in humans

Name of the gland	Location	Hormone secreted	Functions	Deficiency or excess
Hypothalamus	Present in brain	Produces 'releasing hormones' and 'inhibitory hormones'	Regulate the secretion of hormones from pituitary gland	
Pituitary gland (master gland)	Present just below the brain	Secretes several enzymes for ex. Growth hormone (HGH)	Controls the development of bones and muscles.	Deficiency of growth hormone in childhood leads to dwarfism and excess leads to gigantism (giantness)
Thyroid gland	Attached to wind pipe	Thyroxin (contains iodine)	Control the rate of metabolism of fats, proteins and carbohydrates.	Deficiency of thyroxin causes goiter.
Parathyroid	Four parathyroid glands embedded in thyroid gland.	Para hormone	Regulate calcium and phosphate level in blood.	
Thymus	Lower part of neck and upper part of chest	Thymus hormone	Plays a role in development of immune system in the body.	Note: it is larger in young children but shrink after puberty
Pancreas (both exocrine and endocrine)	Just below the stomach	Insulin and glucagon	Control blood sugar level. Insulin: lowers blood sugar level. Glucagon: higher blood sugar level.	Deficiency of insulin causes diabetes.
Adrenal (both exocrine and endocrine)	Located on the top of two kidney	Adrenaline hormone	Regulate heart beat, breathing rate, blood pressure and carbohydrate metabolism.	Note: it is also known as gland of emergency.
Testes (present only in males)	Outside the abdominal cavity within the scrotum	Male sex hormone i.e. testosterone	Control development of male sex organ and male sex features such as deeper voice, beard etc. Also makes the male gamete sperms.	
Ovary	Present only in females	Female sex hormones i.e. oestrogen and progesterone	Oestrogen: control the development of female sex organ and female sex features such as feminine voice, soft skin, mammary glands etc. Progesterone: maintaining the pregnancy. Control the uterus changing during menstrual cycle. Ovaries make the female gamete called ova or egg.	

16. Mention the different plant hormones write its function

PLANT HORMONE	FUNCTIONS
Auxins	Promote cell enlargement and cell differentiation. Promote fruit growth. (responsible for phototropic and geotropic responses in plants).
Gibberellins	Promote cell enlargement and cell differentiation in the presence of auxins. Promote fruit growth.Help in breaking dormancy of seeds and buds.
Cytokinins	Promote cell division. Promote fruit growth. Help in breaking dormancy of seeds and buds. Delay the ageing in leaves. Promote opening of stomata.
Abscisic acid (ABA, growth inhibitor)	Promote the dormancy of seeds and buds. Promote closing of stomata. Promote the wilting and falling of leaves.

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3. OUR ENVIRONMENT

Why are some substances biodegradable and some non-biodegradable?

- Substances are classified as biodegradable and non-biodegradable because some substances can be decomposed by microorganisms and some cannot.
- Substances that are broken down into simple soluble forms are called biodegradable substances and the substances that are not decomposed by microorganisms into harmless substances are called non biodegradable substances.

Give any two ways in which biodegradable substances would affect the environment.

Biodegradable substances affect the environment by:

→ The biodegradable substances such as tree leaves, plant parts, and kitchen wastes can be used as humus after composting. This will enhance the soil fertility.

→ The biodegradable substances mainly contain carbon. These substances after decomposition release that carbon back into the atmosphere.

Give any two ways in which non-biodegradable substances would affect the environment.

Non-biodegradable substances affect the environment by:

→ They contaminate soil and water resources as they cannot be decomposed by micro-organisms.

→ These substances, when accidentally eaten by stray animals, can harm them and can even cause their death.

What is the role of decomposers in the ecosystem?

Various role played by decomposers in the ecosystem are:

→ They clean the environment.

→ They decompose biodegradable substances into useful substances.

→ They release nutrients into soil by decomposing dead and decaying matter, thus making the soil fertile.

→ They maintain the nutrient pool by returning back the nutrients in the pool.

What is ozone and how does it affect any ecosystem?

Ozone (O3) is a molecule, made up of three atoms of oxygen.

Ozone (O3) forms a layer in the upper atmosphere. It is very essential for the life on this planet. It shields the surface of the earth from ultra-violet radiation (UV) coming from sun as these radiations are very harmful causing skin cancer and cataract in humans. It also does harm to the crops.

. **How can you help in reducing the problem of waste disposal? Give any two method**

We can help in reducing the problem of waste disposal by these methods:

→ By separating biodegradable substances from non-biodegradable substances.

→ By reducing, reusing and recycling non-biodegradable substances.

What is the important function of presence of ozone in earth's atmosphere?

Ozone layer absorbs the harmful UV radiations of the sunlight, so this layer is very important for the survival and existence of life on earth.

What happens when higher energy ultraviolet radiations act on the oxygen at the higher level of the atmosphere?

The high energy ultraviolet radiation (UV radiation) coming from the Sun splits oxygen gas into free oxygen atoms

$$O_2 \xrightarrow[\text{(from Sun)}]{\text{UV radiation}} \underset{\text{Oxygen atom}}{O} + \underset{\text{Oxygen atom}}{O}$$

The free oxygen atoms thus produced react with an oxygen molecule to form ozone molecule

$$\underset{\text{Oxygen molecule}}{O_2} + \underset{\text{Oxygen atom}}{O} \longrightarrow \underset{\text{Ozone molecule}}{O_3}$$

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4.HOW DO ORGANISMS REPRODUCE?

1. How is the process of pollination different from fertilization?

Pollination is the process of transfer of pollens from anther to stigma. It occurs with the help of certain pollinators such as air, water, birds, or some insects.

Fertilization, is the fusion of the male and female gametes. It occurs inside the ovule and leads to the formation of zygote.

2. What is the role of the seminal vesicles and the prostate gland?

- The secretions from seminal vesicles and prostate glands lubricate the sperms and provide a fluid medium for easy transport of sperms.
- Their secretion also provides nutrient in the form of fructose, calcium, and some enzymes.

3. What are the changes seen in girls at the time of puberty?

The changes seen in girls at the time of puberty are:

→ Increase in breast size and darkening of skin of the nipples present at the tips of the breasts.
→ Appearance of hair in the genital area.
→ Appearance of hair in other areas of skin like underarms, face, hands, and legs.
→ Increase in the size of uterus and ovary.
→ Beginning of menstrual cycle.
→ More secretion of oil from the skin, which results in the appearance of pimples.

4. How does the embryo get nourishment inside the mother's body?

- After fertilization the lining of uterus thickens and is richly supplied with blood to nourish the growing embryo.
- The embryo gets nutrition from the mother's blood with he help of a special tissue called placenta.
- It is embedded in the uterine wall. Placenta contains Villi on the embryo's side of the tissue and blood spaces on mother's side surrounding the villi.
- This provides a large surface from mother to the embryo and waste products from embryo to mother.

5. If a woman is using a copper-T, will it help in protecting her from sexually transmitted diseases?

No, because copper-T will not prevent contact body fluids. Thus it will not protect her from sexually transmitted diseases.

6. What are the functions performed by the testis in human beings?

Functions of testes:

→ Produce sperms, which contain haploid set of chromosomes of father.
→ Produce a hormone called testosterone, which brings about secondary sexual characters in boys.

7. Why does menstruation occur?

- Menstruation is a process in which blood and mucous flows out every month through the vagina.
- This process occurs every month because one egg is released from the ovary every month and at the same time, the uterus (womb) prepares itself to receive the fertilized egg.
- Thus, the inner lining of the uterus gets thickened and is supplied with blood to nourish the embryo.
- If the egg does not get fertilised, then the lining of the uterus breaks down slowly and gets released in the form of blood and mucous from the vagina.

8. What are the different methods of contraception?

The contraceptive methods can be broadly divided into the following types:

→ **Natural method:**

- It involves avoiding the chances of meeting of sperms and ovum.
- In this method, the sexual act is avoided from day 10th to 17th of the menstrual cycle because during this period, ovulation is expected and therefore, the chances of fertilization are very high.

→ **Barrier method:**

- In this method, the fertilization of ovum and sperm is prevented with the help of barriers.
- Barriers are available for both males and females. Condoms are barriers made of thin rubber that are used to cover penis in males and vagina in females.

→ **Oral contraceptives**:

- In this method, tablets or drugs are taken orally.
- These contain small doses of hormones that prevent the release of eggs and thus fertilization cannot occur.

→ **Implants and surgical methods**:

- Contraceptive devices such as the loop or Copper-T are placed in uterus to prevent pregnancy.
- Some surgical methods can also be used to block the gamete transfer. It includes the blocking of vas deferens to prevent the transfer of sperms known as **vasectomy.**
- Similarly, fallopian tubes of the female can be blocked so that the egg will not reach the uterus known as **tubectomy**.

9. What could be the reasons for adopting contraceptive methods?

Contraceptive methods are mainly adopted because of the following reasons:

→ To prevent unwanted pregnancies.
→ To control population rise or birth rate.
→ To prevent the transfer of sexually transmitted diseases.

10. (a) Explain the development of fertilized egg into a foetus in a woman .

(b) In humans , how the surgical contraceptive methods can be used to prevent pregnancy?

(a)

- The fertilized eggs starts dividing and forms a ball of cells or embryo.
- The embryo is implanted in the lining of the uterus where they continue to grow and dovelop organs to become foetus

(b)

- If the vas deferens in the main is blocked , sperm transfer will be prevented, Fertilization will not take place.
- If the fallopian tube in the woman is blocked,the egg will not be able to reach the uterus. Frtilization will not take place

13. Explain the significant function of each structure in human male reproductive system.

- **Testis:** They produce sperms and testosterone hormone which is responsible for male characters.
- **Scrotum:** They regulate temperature necessary for production of sperms .
- **Urethra and vas deferens:** Transport sperm from testis.
- **Prostate gland and seminal vesicle:** They add their secretion to make the sperm transport easier and provide nutrition.
- **Penis:** Delivers the sperms to the site of fertilization.

14. Explain the structure and important role of placenta during gestation period of woman.

- During pregnancy period the embryo gets nutrition from the mother's blood with help of disc shaped special tissue embedded in the uterine wall is called placenta.
- It contains villi on the developing side of the tissue.
- Villi provide glucose and oxygen to pass from mother to embryo.
- Removes the wastes generated from the embryo.

15.What are the post fertilization changes occurs in flowers?

→ The fusion of male and female gametes is called fertilization. Zygote is produced inside the ovary.
→ Zygote divides to form embryo. Ovule develops thick coat and changes into seed gradually.
→ Ovary changes into fruit and other parts of flower fall off.

16.Expand STDs

Sexually Transmitted Diseases (STDs)
→ Many diseases can be sexually transmitted such as:
(i) Bacterial : Gonorrhoea and syphilis
(ii) Viral : Warts and HIV-AIDS
→ Use of condom prevents these infections to some extent.

17.Write a note on Female Foeticide

Female Foeticide

→ The practice of killing a female child inside the womb is called female foeticide.
→For a healthy society, a balanced sex ratio is needed that can be achieved by educating people to avoid malpractices like female foeticide and prenatal sex determination.
→ Prenatal sex determination is a legal offence in our country so as to maintain a balanced sex ratio

5.HEREDITY AND EVOLUTION

1. How is the sex of the child determined in human beings?

- In human beings, the females have two X chromosomes and the males have one X and one Y chromosome. Therefore, the females are XX and the males are XY.
- The gametes, as we know, receive half of the chromosomes. The male gametes have 22 autosomes and either X or Y sex chromosome.
- Type of male gametes: 22+X OR 22+ Y. However, since the females have XX sex chromosomes, their gametes can only have X sex chromosome.

Type of female gamete: 22+X

Thus, the mother provides only X chromosomes. The sex of the baby is determined by the type of male gamete (X or Y) that fuses with the X chromosome of the female.

2. What factors could lead to the rise of a new species?

Natural selection, genetic drift and acquisition of traits during the life time of an individual can give rise to new species.

3. What are fossils? What do they tell us about the process of evolution?

- Fossils are the remains of organisms that once existed on earth.
- They tell us about the development of the structures from simple structured to complex structured organisms.
- They tell us about the phases of evolutions through which they must have undergone in order to sustain
- Them selves in the competitive environment.

4. Explain the terms analogous and homologous organs with examples.

Homologus organs: are those organs which have the same basic structural design and origin but have different functions.
For Example: The forelimbs of humans and the wings of birds look different externally but their skeletal structure is similar.

Analogus organs :are those organs which have the different basic structural design and origin but have similar functions.
For Example: The wings of birds and insects.

5. Explain the importance of fossils in deciding evolutionary relationships.

Answer

Fossil provide us evidence about

→ The organisms that lived long ago such as the time period during which they lived, their structure etc.
→ Evolutionary development of species i.e., line of their development.
→ Connecting links between two groups. For example, feathers present in some dinosaurs means that birds are very closely related to reptiles.
→ Which organisms evolved earlier and which later.
→ Development of complex body designs from the simple body designs.

7. What is speciation? What factors could lead to the speciation?

Formation of new and distinct species in the course of evolution from the existing species. The factors that could lead to the rise of a new species are :-
1.Natural selection, 2. Genetic drift, 3.Geographical isolation

8. Differentiate between acquired traits and inherited traits.

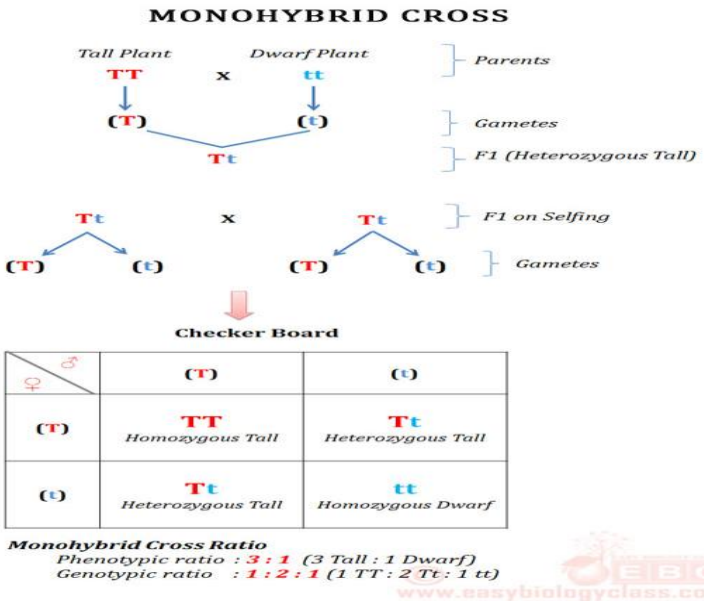
Sl.No	Acquired traits	Inherited traits
1	developed during the lifetime of an	Characteristics transmitted from parent to
2	Cannot be passed on to	Can be passed on to
3	Doesn't bring change in DNA of germ	Bring changes in DNA of germ cells.
	Ex, Dancing ability in man	Skin color in man

9. Explain the two methods to estimate the age of fossils.

- **Relative method**—If we dig into the earth the fossils we find closer to the earth's surface are more recent than the fossils we find in deeper layers.
- By detecting the ratios of different isotopes of the same element in the fossil material.

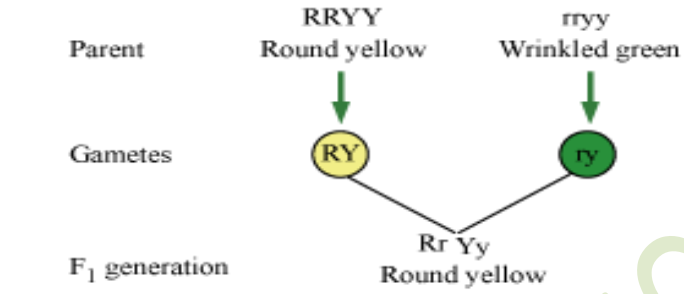
12.What is monohybrid cross? Write its graphical representation

The cross between two pea plants with one pair of contrasting characters is called monohybrid cross.



13. What is Dihybrid cross? The plant bear in ground yellow coloured (*RrYy*) seed are self pollinated with the same plant. Represent the result obtained in the F_2 generation of dihybridcross with the help of a checkerboard. Mention the varieties of plants obtained in F_2generation.

Answer : The cross between two pea plants with two pair of contrasting characters is called dihybrid cross.



	RY	rY	Ry	ry
RY	RRYY Round yellow	RrYY Round yellow	RRYy Round yellow	RrYy Round yellow
rY	RrYY Round yellow	rrYY Wrinkled yellow	RrYy Round yellow	rrYy Wrinkled yellow
Ry	RRYy Round yellow	RrYy Round yellow	RRyy Round green	Rryy Round green
ry	RrYy Round yellow	rrYy Wrinkled yellow	Rryy Round green	rryy Wrinkled green

The plants obtained are or **phenotypic ratio 9:3:3:1**

Round yellow—9

Round green —3

Wrinkled yellow—3

Wrinkled green —1

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5. SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

1. "Building crescent shaped earthen embankment in level terrain is better than the construction of large dams across the river to store water" Analyze this statement with their effects.

- Social problems : Effects of the construction of large dams across the rivers
- Economic problems: Swallow up huge amount of public money.
- Environmental problems: They contribute enormously to deforestation and loss of biological diversity.

Advantages of building crescent shaped earthen embankment in level terrain:

- They recharge the ground water beneath.
- Water does not evaporate, but spreads out recharge wells and provide moisture for vegetation.
- It does not provide breeding grounds for mosquitoes like stagnant water collected in ponds or lakes.

List the advantages of 'reduce' and 'reuse' to save environment.

Reduce: By the practice of reduce we can save

- Electricity
- Water
- Food
- Natural resources.

Reuse: By the practice of reuse

- Environment pollution can be controlled
- Materials are available for immediate use
- Energy can be saved
- Use of raw materials can be minimized.

What are the effects of deforestation?

Ans. Effects of deforestation-

(a) Extinction of plants, animals and microbial species.

(b) Threatening of indigenous people whose culture and physical survival depends upon the forests.

(c) Regional and global climate change as the rainfall decrease and drought is common in deforested areas.

(d) Global warming by releasing stored carbon into the atmosphere as carbon-dioxide which is green-house gas.

(e) Increase in soil erosion and decrease in soil fertility.

(f) Increase in floods.

What is meant by water table? Why is it important?

Ans. Water-table- The level of water under the ground is called water table.

Advantages of underground water are-

(a) Instead of evaporation, the stored underground water recharges the wells by spreading out.

(b) It also provides moisture for vegetation over a wide area.

(c) It remains protected from contamination from animal and human wastes.

(d) It does not provide breeding grounds for mosquitoes.

What are the benefits of water harvesting?

Ans. Benefits of water harvesting-

(a) It provides: –

(i) good quality water for homes.

(ii) Self sufficiency for supply of water.

(iii) Control over water sources.

(b) Reduces: –

(i) Local flooding and drainage problems.

(ii) Soil erosion.

(iii) Ground water pollution.

(iv) Cost of usage water.

(b) Conserve ground water and contributes to ecological use.

Who are the stake holders of forests.

Ans. Stakeholder of forest are-

(a) The local people who are living in or around the forests.

(b) The department of forest of the government.

(c) The industrialists.

(d) The wildlife and nature enthusiasts.

How are water resources managed and consumed?

Ans. Water is managed and conserved in following ways-

(a) Install rain water harvesting system in the houses for future use.

(b) Leakage of water in the toilet and pipes should be repaired when it comes in our notice.

(c) To reduce evaporation and improve irrigation efficiency, drip irrigation and sprinkling may be practiced.

(d) Reduce domestic water wastage and try to recycle the waste water at the home..

Write any three steps that you would take for sustainable development of the environment.

Ans. To develop sustainable natural environment we would do following practices-

(a) Save electricity by switching off the lights, fans television, and other electrical appliances when not use/needed.

(b) Use energy efficient electrical appliances. This is done by using compact fluorescent lamps and fluorescent tubes light instead of traditional filament type electric bulbs.

(c) Use public transport for school instead of parent's car.

What are the problems faced by construction of large dams?

Ans. Disadvantages of construction of large dams-

(a) Only privileged section of people get maximum water due to mismanagement of water of canals.

(b) Construction of dams involves deforestation of large trees resulting in imbalance in ecosystem. It also threatens the wild life of the areas.

(c) People close to source canal grow water intensive crop like rice and sugarcane whereas people further down stream do not get any water.

11. List three things which increase pressure on our natural resources.

Ans. (a) More paper is used than required for printing on computer.

(b) Keeping fan on when there is no one in the rooms.

(c) Wastage of food.

(d) Burning of crackers.

(e) Wastage of petrol by unnecessarily starting the motorbike.

12. What are the factors to check the quality of water?

Ans. To check the quality of water certain measurable factors are always followed-

(a) Total coliform count- In human intestines, a group of bacteria called coliform are found. When these bacteria are present in water, it is assumed that water is contaminated by disease causing micro-organisms.

(b) PH of water- If water is highly acidic or basic, it is said to be polluted.

(c) Heavy metals and pesticides- Amount of heavy metals like copper, zinc, lead, etc and pesticide present in water indicates pollution.

13. What changes can you make in your habits to become more environment friendly?

Ans. (a) Separate wastes into recyclable and non- recyclable.

(b) Use electricity judiciously.

(c) Follow three R's (reduce, recycle and reuse).

(d) Eat as much as require do not waste food.

(e) Use water judiciously.

(f) Reuse newspapers and use less plastic.

(g) Have more windows in the house for natural light.

14. What are the results of chipko movement?

Ans. (i) The chipko movement spread across the communities which also awakened the media. This forced the government, to rethink their priorities before making use of forest resources.

(ii) Local people believed in the replenishment of the plants by cutting the unwanted branches and plucking the leaves in such a way that the plants may find time to replenish.

(iii) The destruction of forests could be prevented because the local people were aware of the fact that the destruction of forest always causes loss of forests products forever, degrade the quality of soil and water.

Find out about the traditional systems of water harvesting/management in your region.

The traditional system of water conservation differs from region to region for example.

(a) Khadin, tanks and nadis in Rajasthan

(b) Bandharas and tals in Maharashtra

(c) Ahars and pyenes in Bihar

(d) kattas in Karnataka

What changes would you suggest in your home in order to be environment-friendly?

Ans. We shall follow the principle of three R's

(i) Reduce: Use natural resources in limited quantity avoiding wastage.

(ii) Recycle: Recycle plastic, paper, glass and metal for further use.

(iii) Reuse: Envelops can be reversed for reuse

********** ALL THE BEST **********