

INDEX

SI . No.	LEARNING POINTS	EXPECTED MARKS	Page No.
1	IMPORTANT DIAGRAMS FOR PRACTICE	16	01-03
2	IMPORTANT LAWS FROM ALL CHAPTERS	03	04
3	LIST OF DIFFERENCES	02	05-06
4	IMPORTANT POINTS TO REMEMBER IN PHYSICS	10	07-15
5	IMPORTANT POINTS TO REMEMBER IN CHEMISTRY	10	16-29
6	IMPORTANT POINTS TO REMEMBER IN BIOLOGY	09	30-40
7	PHYSICS SSLC BOARD QP SOLVED BANK	10	41-57
8	CHEMISTRY SSLC BOARD QP SOLVED BANK	10	58-73
9	BIOLOGY SSLC BOARD QP SOLVED BANK	10	74-90
	TOTAL	80	

Important note to the students:

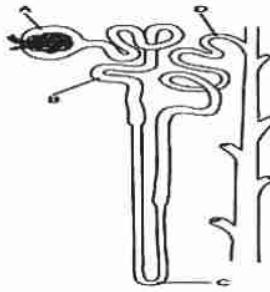
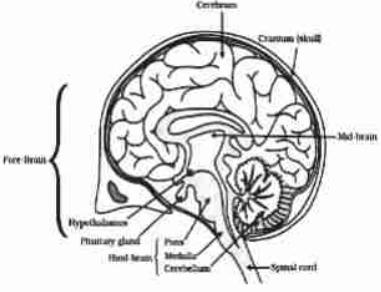
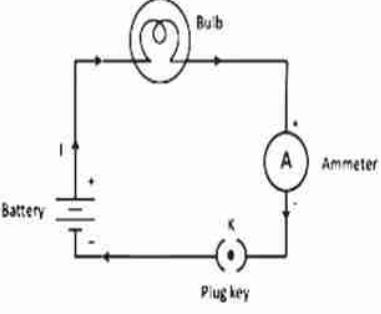
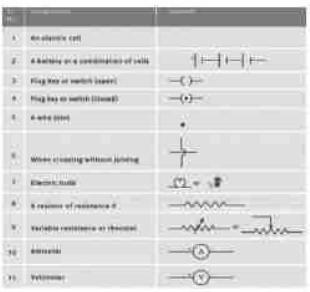
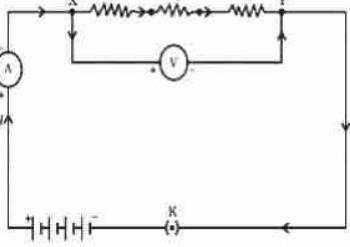
This proposed plan is only to get minimum marks based on the previous year question papers and model papers by the board and students have to study the textbook to get good marks under the guidance of your teacher.

Blue Print Design Total 80 Marks

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

IMPORTANT DIAGRAMS FOR PRACTICE

Sl. No.	Chapter	Name of the Diagram	Page No.	Model diagram
01.	Chemical Reactions and Equation	1.6 Electrolysis of Water	9	
02.	Acids, Bases and Salts	2.1 Reaction of zinc granules with dilute sulphuric acid and testing hydrogen gas by burning	19	
03.	Metals and Nonmetals	3.3 Action of steam on a metal	43	
04.	Metals and Nonmetals	3.12 Electrolytic refining of copper	53	
05.	Life Processes	6.3 a) Open and b) Closed stomatal pore	63	
06.	Life Processes April 2020	6.10 Schematic Sectional view of the human heart	72	

Sl. No.	Chapter	Name of the Diagram	Page No.	Model diagram
07.	Life Processes	5.14 Structure of a nephron	77	
08.	Control and Coordination	6.3 Human brain	84	
09.	Electricity	11.1 A Schematic diagram of an electric circuit	94	
10.	Electricity	Table 11.1 Symbols of some commonly used components in circuit diagrams	97	
11.	Electricity	12.6 Resistors in series	104	

Sl. No.	Chapter	Name of the Diagram	Page No.	Model diagram
12.	Electricity	11.7 Resistors in parallel	104	
13.	Magnetic effects of Electric Current	13.6(a) A pattern of Concentric circles indicating the field lines of a magnetic field around a straight conducting wire	121	
14.	How do organisms reproduce Apr 2020	7.8 Germination of pollen on stigma	45	
15.	Light Reflection and Refraction	9.7 (a) (b) (c) (d) (e) (f), Ray diagrams for the image formation by a concave mirror	76	
16.	Light Reflection and Refraction	9.16 (a) (b) (c) (d) (e) (f) The position size and the nature of the image formed by a convex lens for various positions of the object	90-91	
17.	The Human Eye and the colorful world	10.6 Recombination of the spectrum of white light	103	

IMPORTANT LAWS

1. State 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. State joules law of heating.

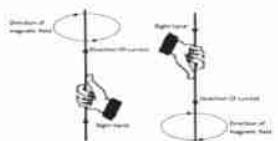
The amount of heat produced in a current conducting wire, is proportional to the square of the amount of current that is flowing through the wire, when the electrical resistance of the wire and the time of current flowing are constant.

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)

$$H= I^2 R t$$



3. State 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."

4. State 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



5. State laws of reflection of light.

1. The angle of incidence is equal to the angle of reflection, and
2. The incident ray, the normal to the mirror at the point of incidence and the reflected ray, all lie in the same plane.

6. State laws of refraction of light :-

1. The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence, all lie in the same plane.
2. The ratio of sine of angle of incidence to the sine of angle of refraction is a constant, for the light of a given colour and for the given pair of media. This law is also known as Snell's law of refraction.

$$\frac{\sin i}{\sin r} = \text{constant}$$

7. State law of conservation of mass.

The law of conservation of mass states that mass can neither be created nor destroyed in a chemical reaction.

8. State 10 percent law.

According to 10% law, only 10% of the energy entering a particular trophic level of organisms is available for transfer to the next higher trophic level.

* * *

LIST OF DIFFERENCES

1. Ammeter and Voltmeter

Sl. No.	Ammeter	Voltmeter
01.	Used to measure the current.	Used to measure the current.
02.	Connected in series in the electric circuit.	Connected in parallel in the electric circuit.
03.	Has low resistance	Has high resistance

2. Resistivity and Resistance

Sl. No.	Resistivity	Resistance
01.	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.
02.	It is an intrinsic property.	It is an extrinsic property.
03.	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.
04 .	The unit o resistivity is ohm-meter.	The unit of resistance is ohm.

3. Saturated and Unsaturated Hydrocarbons :

Sl. No.	Saturated Hydrocarbons	Unsaturated Hydrocarbons
01.	These have single bond in between carbon atoms.	These have double or triple bond in between carbon atoms.
02.	Are less reactive.	More reactive
03.	Ex : Alkanes and cycloal kanes	Ex :-Alkenes , alkynes

4. Oxidation and Reduction

Sl. No.	Oxidation	Reduction
01.	Addition of oxygen is called oxidation.	Removal of oxygen is called Reduction.
02.	Loss electrons take place.	Gain of electrons takes place.
03.	It is the process of Removal of hydrogen	It is the process of addition of hydrogen

5. Arteries and Veins

Sl. No.	Arteries	Veins
01.	These carry blood away from the heart.	These carry blood towards the heart.
02.	The flow of blood is fast in arteries.	The flow of blood is slow in veins.

6. Concave and Convex Mirrors

Sl. No.	Concave Mirror	Convex Mirror
01.	These are converging mirrors	These are diverging mirrors
02.	Inner surface acts as reflecting surface.	Outer surface acts as reflecting surface.
03.	Used in headlights of the vehicles	Used as rear view mirrors of the vehicles.

7. Concave and Convex Lens:

Sl. No.	Concave Lens	Convex Lens
01.	It is thin in the middle and thick at the edges	It is thick in the middle and thin at the edges
02.	These are called as diverging lens	These are called converging lens.
03.	Always produce real and inverted images.	It produces both real and virtual images.

8. Corrosion and Rancidity

Sl. No.	CORrosion	Rancidity
01.	The process of slow and steady destruction of metals by oxidation	The process of oxidation of oils which produce foul smell.
02.	Ex : Rusting of iron	Ex : Oxidation of oils and fats.

9. Exothermic and Endothermic Reactions

Sl. No.	Exothermic Reactions	Endothermic Reactions
01.	The reaction in which heat is liberated.	The reaction in which heat is absorbed.
02.	Ex : Digestion of food	Ex : Melting of ice.
	$C + O_2 \longrightarrow CO_2(g) + \text{heat}$	$CaCO_3 + \text{Heat} \longrightarrow CaO + CO_2$

10. Bio Degradable Substances and Non-Biodegradable Substances

Sl. No.	Biodegradable	Non-Biodegradable
01.	The wastes decompose naturally in the environment.	The waste does not decompose naturally.
02.	They are safe for the environment.	They are harmful to the environment and create pollution.
	Ex: waste paper, cow dung, plant waste	Ex: plastic bag, cans, etc

IMPORTANT POINTS TO REMEMBER IN PHYSICS

Sl. No.	Quantity	S I Unit
01.	Electric current (I)	Ampere (A)
02.	Electric charge (Q)	Coulomb (C)
03.	Time (t) = Q/I	Second (S)
04.	Potential difference (V)	Volt (V)
05.	Work done (W) = VQ	Joule (J)
06.	Resistance	Ohm (Ω)
07.	Resistivity (rho)	Ωm
08.	Electric power	Watt (W)
09.	Electrical energy	Watt hour (Wh)
10.	Commercial unit of electrical energy	Kilowatt hour (kWh)

Physical Term	Formula
Electric Charge (Q)	$Q = I \times t$
Electric current (I)	$I = \frac{Q}{t}$
Potential difference (V)	$V = IR$ $V = W/Q$
Resistance (R)	$R = \frac{V}{I}$
Resistivity (ρ)	$R = \rho \frac{l}{A}$
Resistors in series	$R_s = R_1 + R_2 + R_3$
Effective resistance in combination of Resistors in parallel	$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$
Heat produced in a conductor (H)	$H = V I t$ $H = I^2 R t$
Electrical power (P)	$P = VI$ $P = I^2 R$ $P = V^2/R$

IMPORTANT TERMS

1. Electric power (P)

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

2. Electric current (I)

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

3. Resistivity

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

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

Important Definitions

1A	One ampere is constituted by the flow of one coulomb of charge per second. $(1A = \frac{1C}{1S})$
1C	6×10^{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. $1 V = \frac{1 \text{ joule}}{1 \text{ coulomb}}$
1Ω	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. $1 W = 1 \text{ volt} \times 1 \text{ ampere}$
1Kilowatt	1000 watts
1kWh	$1000 \text{ watt} \times 3600 \text{ seconds} = 3.6 \times 10^6 \text{ joule}$

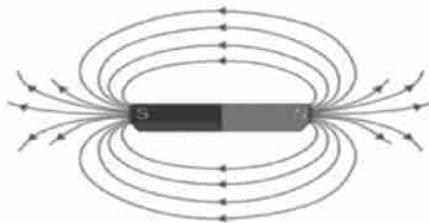
Practical application of heating effect of electric current

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	<ul style="list-style-type: none">• 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.

2. MAGNETIC EFFECT OF ELECTRIC CURRENT

1. 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.

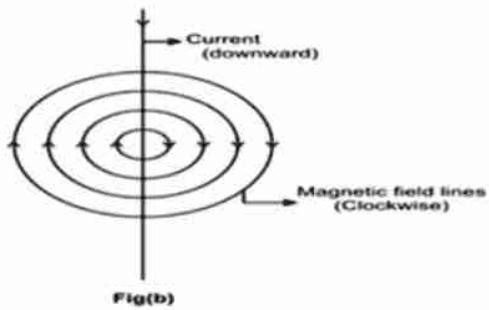
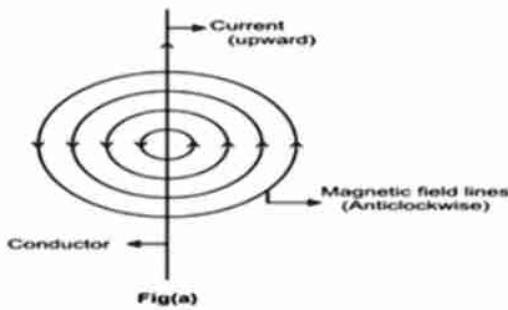


2. Magnetic field due to a current carrying conductor.

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

3. Magnetic field due to a current through a straight conductor

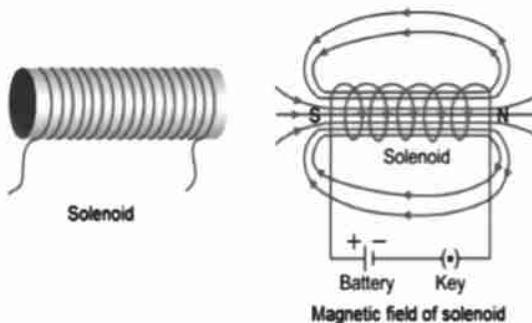
- If current flows in upward direction then direction will be anticlockwise.
- If current flows in downward direction then direction will be clockwise.



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

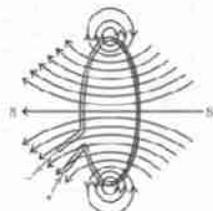
- Magnetic field strength is directly proportional to the magnitude of current flowing in the conductor. Greater the current in the conductor, stronger will be the magnetic field produced.
- Magnetic field strength is inversely proportional to the distance from the wire. Greater the distance from the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

5. Magnetic field due to a current in a solenoid



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

Magnetic Field in a Circular Loop



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.

6. 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, aluminum 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 wire 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.

* * *

3. LIGHT- REFLECTION AND REFRACTION

Reflection of light: The phenomenon of bouncing back of light into the same medium by the smooth surface is called reflection.

Characteristics of the image formed by a plane mirror:

- ❖ It is virtual
- ❖ It is erect and of the same size as the object
- ❖ The distance of the object from the plane mirror is the same as the distance of the image from the plane mirror.
- ❖ It is laterally inverted.

➤ **Terms related to spherical mirrors:**

1. **Centre of curvature (C):** Centre of the sphere of which the mirror is a part.
2. **Radius of curvature (R):** It's the linear distance between Pole and the Center of curvature.
3. **Pole (P):** It's the midpoint of the spherical mirror.
4. **Principal axis:** Straight line joining the pole of the mirror to its Centre of curvature.
5. **Aperture:** An aperture of a mirror or lens is a point from which the reflection of light actually happens. It also gives the size of the mirror.
6. **Focus:** It's any given point, where light rays parallel to the principal axis, will converge after getting reflected from the mirror.
7. **Focal length (f):** Is defined as the distance between the optical centre and principal focus of the lens.

➤ **Image formation by a concave mirror for different positions of the object:**

Position of the object	Position of the image	Size of the image	Nature of the image
At infinity	At the focus F	Highly diminished, point sized	Real and inverted
Beyond C	Between F and C	Diminished	Real and inverted
At C	At C	Same size	Real and inverted
Between C and F	Beyond C	Enlarged	Real and inverted
At F	At infinity	Highly enlarged	Real and inverted
Between P and F	Behind the mirror	Enlarged	Virtual and erect

➤ **Image formation by a convex mirror for different positions of the object:**

Position of the object	Position of the image	Size of the image	Nature of the image
At infinity	At the focus F, behind the mirror	Highly diminished, point sized	Highly diminished, point sized
Between infinity and the pole P of the mirror	Between P and F, behind the mirror	Diminished	Virtual and erect

➤ **Uses of spherical mirrors:**

Concave mirror used in	Reason	Sample picture
• Torches • Search lights • Vehicle head lights	To get powerful parallel beam of light.	
Shaving mirrors	To see a larger image of the face.	
Dentists mirrors	To see large images of the teeth of patients.	
Solar furnace	To concentrate sunlight to produce heat.	

Convex mirror used in	Reason	Sample picture
Rear view (wing) mirrors in vehicles	• They always give an erect, diminished image. • They have a wider field of view as they are curved outwards.	

Physical Term	Formula
Focal length	$F=R/2$
Mirror formula	$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$
Magnification of a mirror	$m = \frac{h_1}{h} = -\frac{v}{u}$

REFRACTION OF LIGHT :

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

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



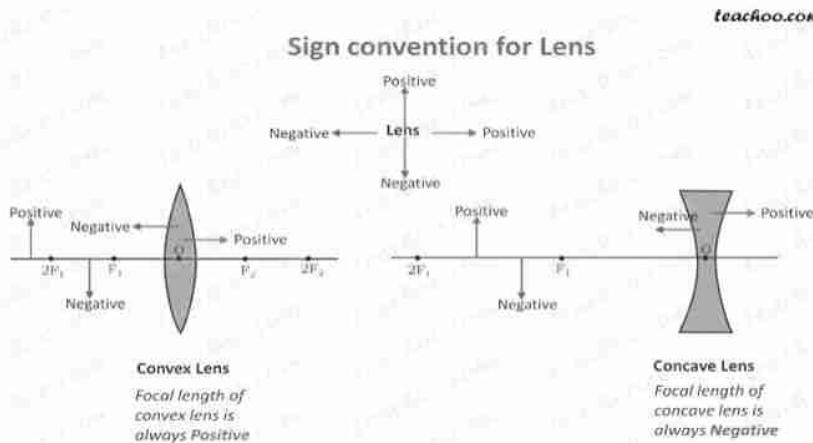
Concave Lens

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

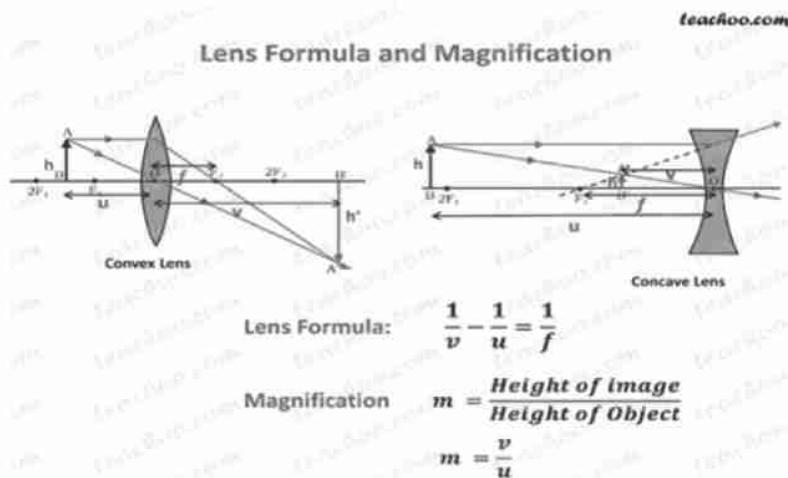
1. Optical centre (O) is defined as the point on the lens which is on the principal axis and the light ray doesn't deflect when passes through it.
2. Centre of curvature (2F1 & 2F2) is defined as the centre of the surface of sphere of which the lens is a part. Since, a lens has two surfaces, so the lens 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.

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



f = focal length (m)
u = object distance (m)
v = image distance (m)

Power of a lens

- The power of lens is defined as the reciprocal of its focal length.
- S I unit power of lens is Dioptrre. It is denoted by 'D'
- 1 dioptrre 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
+2.0D	+0.50 m	convex
-2.5D	-0.40 m	concave

4. THE HUMAN EYE AND THE COLOURFUL WORLD

- **POWER OF ACCOMMODATION:** The ability of the eye lens to adjust its focal length is called accommodation.

NORMAL VISION	RANGE
Near point of the eye	25cm
Far point of the eye	Infinity

➤ **Defects of vision and their remedies**

Defects of vision	Definition	Reason	Remedies
Myopia (near sightedness)	A person with myopia can see nearby objects clearly but cannot see distant objects distinctly.	<ul style="list-style-type: none"> ➤ Far point is nearer than infinity. ➤ Excessive curvature of eye lens. ➤ Elongation of the eyeball. 	Usage of CONCAVE LENS of suitable power.
Hypermetropia (far sightedness)	A person with hypermetropia can see distant objects clearly but cannot see nearby objects distinctly.	<ul style="list-style-type: none"> ➤ The near point is farther away from the normal near point. ➤ The focal length of the eye lens is too long. ➤ The eye ball has come too small. 	Usage of a CONVEX LENS of suitable power.
Presbyopia	The power of accommodation of the eye usually decreases with ageing. The near point gradually recedes away.	<ul style="list-style-type: none"> ➤ Diminishing flexibility of the eyelens. ➤ Gradual weakening of the ciliary muscles. 	A common type of BI-FOCAL lenses (concave and convex lenses)
Cataract	Partial or complete loss of vision.	<ul style="list-style-type: none"> ➤ The crystalline lens of people at old age becomes milky and cloudy. 	It is possible to restore vision through a cataract surgery.

➤ **Important questions:**

1. **Why do stars twinkle?**

Ans: stars only appear to twinkle when seen from the Earth's surface. The stars seem to twinkle in the night sky due to the effects of the Earth's atmosphere. When starlight enters the atmosphere, it is affected by winds in the atmosphere and areas with different temperatures and densities. This causes the light from the star to twinkle when seen from the ground.

2. **Explain why the planets do not twinkle?**

Ans: Planets are closer to us as compared to stars. Stars are very far away from us and appear as point sizes to us. Due to this, it seems as if the light is coming from one point source. On the contrary, planets are at a lesser distance from us as compared to stars. Due to this reason, they appear much more prominent, and the light seems to come from more than one point source. The dimming effect of some of the points of light coming from the planet is nullified by the brightening effect of light coming from other points.

3. **Why does the sun appear reddish early in the morning?**

Ans: At the time of sunrise and sunset, the sun rays have to travel a longer distance due to the curvature of Earth. This means that most of the blue light gets scattered away before reaching our eyes. The Red light, however, has the highest wavelength in the visible spectrum, so it is the only components that reaches our eyes and makes the sun appear reddish in the early morning.

4. **Why does the sky appear dark instead of blue to an astronaut?**

Ans: Because there is no atmosphere containing air in outer space to scatter sunlight. Since there is no scattered light to reach our eyes in outer space, the sky appears to be dark there.

CHEMISTRY

1. CHEMICAL REACTIONS & EQUATIONS

➤ TYPES OF CHEMICAL REACTIONS:

Sl. No.	Types of Reactions	Definition	Examples
1.	Combination reaction	A single product is formed from two or more reactants.	$2\text{Mg} + \text{O}_2 \longrightarrow 2\text{MgO}$
2.	Decomposition reaction	A single reactant breaks down to Yield two or more products.	
	➤ Thermal decomposition	Decomposition reaction carried out by heat	$2\text{Pb}(\text{NO}_3)_2 \longrightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$
	➤ Electrolytic decomposition	Decomposition reaction carried out by electricity.	$2\text{H}_2\text{O} \longrightarrow 2\text{H}_2 + \text{O}_2$
	➤ Photo chemical reaction	Decomposition reaction carried out by light.	$2\text{AgBr} \longrightarrow 2\text{Ag} + \text{Br}_2$
3.	Displacement reaction	A Reaction in which more reactive element is displaced less reactive element.	$\text{Zn} + \text{CuSO}_4 \longrightarrow \text{ZnSO}_4 + \text{Cu}$
4.	Double displacement reaction	A Reaction in which Exchange of ions between reactants.	$\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \longrightarrow \text{BaSO}_4 + 2\text{NaCl}$
5.	Redox reaction	A Reaction in which Both oxidation and reduction take place simultaneously	$\text{CuO} + \text{H}_2 \longrightarrow \text{Cu} + \text{H}_2\text{O}$

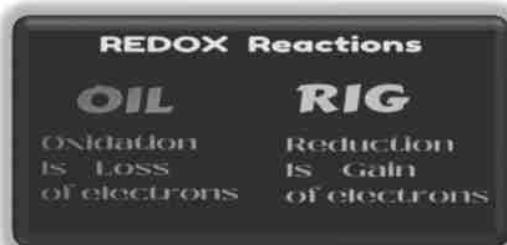
Redoxreaction :

Chemical reaction in which both oxidation and reduction take place simultaneously.

S.No.	Oxidation:	Reduction
1.	Reaction that involves the gain of oxygen or loss of hydrogen.	Reaction that shows the loss of oxygen or gain of hydrogen
2.	$2\text{Cu} + \text{O}_2 \longrightarrow 2\text{CuO}$	$\text{CuO} + \text{H}_2 \longrightarrow \text{Cu} + \text{CO}$

CuO is reduced to Cu \longrightarrow reduction

H₂ is oxidized to H₂O \longrightarrow oxidation



a) **Corrosion:** Slow eating up of metal by the action of Moisture, air, acids and bases.

Metal	Chemical formula
Corrosion (rusting) of iron	$\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$ (Hydrated iron oxide)
Corrosion of copper	$\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$ (Basic copper carbonate)
Corrosion of silver	Ag_2S (Silver sulphide)
Corrosion of Aluminium	Al_2O_3 (Aluminium oxide)

b) **Rancidity:** Oxidation of oils or fats in a food resulting into a bad smell and taste

Preventive methods:

- Adding antioxidants to the food materials.
- Storing food in air tight container
- Flushing out air with nitrogen gas.
- Refrigeration

* * *

2. ACIDS, BASES AND SALTS

➤ 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 :

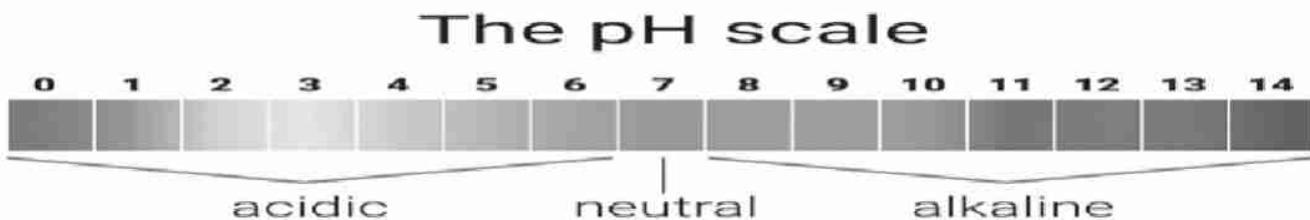
- Litmus solution extracted from lichen belongs to thallophyta division.
- If it is dipped in “Acidic” media it turns **Blue** litmus to **Red**.
- If it is dipped in “Basic” media it turns **Red** litmus to **Blue**.

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

➤ Synthetic Indicators:

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

Types of media	Colour of Phenolphthalein	Types of media	Colour of Methyl Orange
Acidic media	Colourless	Acidic media	Red
Basic media	Pink	Basic media	Yellow
Neutral media	Colourless	Neutral media	Orange



➤ 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.

a) 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.

b) 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



Sl. No.	By Products of Chlor-Alkali Process	Released at	USES
1	Sodium Hydroxide (NaOH)	Near Cathode	Degreasing metals, soaps and detergents, paper making, artificial fibres.
2	Hydrogen gas(H ₂)	Cathode	Fuels,Margarine, Ammonia for fertilizers.
3	Chlorine gas (Cl ₂)	Anode	Water treatment, swimming pools, PVC, disinfectants, CFCs, Pesticides.

➤ Salts and their uses:

Common Name	Chemical name/ Chemical formula	Preparation	Uses
Bleaching powder	Calcium Oxy chloride CaOCl₂	By the action of chlorine on dry slaked lime $\text{Ca}(\text{OH})_2 + \text{Cl}_2 \longrightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$	➤ Bleaching Cotton & linen intextile industry. ➤ Used as oxidizingagent. ➤ Disinfecting water.
Baking soda	Sodium hydrogen carbonate NaHCO₃	$\text{NaCl} + \text{NH}_3 + \text{CO}_2 + \text{H}_2 \longrightarrow \text{NaHCO}_3 + \text{NH}_4\text{Cl}$ →	➤ Ingredient of baking powder (Baking soda + tartaric acid). ➤ Used as antacid. ➤ Used in soda-acid fire-extinguishers.
Washing soda	Sodium carbonate Deca hydrate Na₂CO₃.10 H₂O	$\text{Na}_2\text{CO}_3 + 10\text{H}_2\text{O} \longrightarrow \text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$	➤ Used in glass, soap &paper industries. Manufacture of ➤ Borax. ➤ Softening of hard water.
Plaster of Paris	Calcium sulphate Hemihydrate CaSO₄. $\frac{1}{2}$ H₂O	$\text{CaSO}_4 \cdot 2\text{H}_2\text{O} \longrightarrow \text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O} + 1\frac{1}{2} \text{H}_2\text{O}$	➤ Plastering fractured bones. ➤ Making toys, decorative materials, statues.

2. METALS AND NON-METALS

➤ **Physical Properties of Metals:**

Properties	Definition	Examples
Metalliclustre	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.

➤ **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 and easily cut with knife.
Diamond	Hardest natural substance.
Graphite (allotrope of Carbon)	Non-Metal with a good conductor of electricity.

➤ **WHAT ARE AMPHOTERIC OXIDES? GIVE EXAMPLE.**

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: $\text{Al}_2\text{O}_3 + 6\text{HCl} \rightarrow 2\text{AlCl}_3 + 3\text{H}_2\text{O}$ $\text{Al}_2\text{O}_3 + 2\text{NaOH} \rightarrow 2\text{NaAlO}_2 + \text{H}_2\text{O}$

➤ List the 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	<ul style="list-style-type: none"> ✓ 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.

Reactivity of Some common Metals		
Please	K (Potassium)	Most Reactive
Start	Na (Sodium)	
Calling	Ca (Calcium)	
Me	Mg (Magnesium)	
A	Al (Aluminum)	
Zebra	Zn (Zinc)	
Instead	Fe (Iron)	
Try	Sn (Tin)	
Learning	Pb (Lead)	
How	H (Hydrogen)	
Copper	Cu (Copper)	
Saves	Ag (Silver)	
Gold	Au (Gold)	Least Reactive

Reactivity
Decreases

REACTIVITY SERIES OF METALS		
Lithium	Li	Most reactive metal
Potassium	K	
Barium	Ba	
Sodium	Na	
Calcium	Ca	
Magnesium	Mg	
Aluminum	Al	
Zinc	Zn	
Iron	Fe	
Nickel	Ni	
Tin	Sn	
Lead	Pb	
Hydrogen	H	
Copper	Cu	
Mercury	Hg	
Silver	Ag	
Gold	Au	
Platinum	Pt	Least reactive metal

Reactivity increases

Metals more reactive than hydrogen

Reactivity decreases

➤ 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.



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.
$2\text{ZnS}_{(\text{s})} + 3\text{O}_{2(\text{g})} \longrightarrow 2\text{ZnO}_{(\text{s})} + 2\text{SO}_{2(\text{g})}$	$\text{ZnCO}_{3(\text{s})} \longrightarrow \text{ZnO}_{(\text{s})} + \text{CO}_{2(\text{g})}$

➤ What is Thermite reaction? With example.

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



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.



* Aluminium is obtained by electrolytic reduction of aluminium oxide

Prevention of Corrosion of Iron:

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

ALLOYS

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

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	It is restorative, toughness.	Dentists for fillings in teeth.
Alloy of Gold	gold and silver or gold and copper	Harder than Pure Gold	Making Gold ornaments.

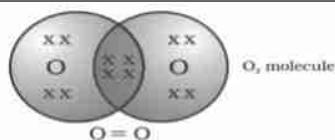
3. CARBON AND ITS COMPOUNDS

Electron Dot Structure:

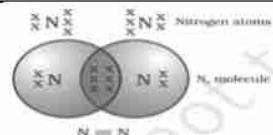
Electron dot structure of Hydrogen Molecule



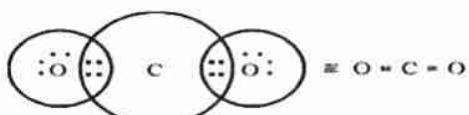
Electron dot structure of Oxygen Molecule.



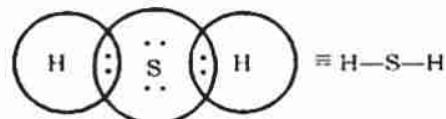
Electron dot structure Nitrogen Molecule.



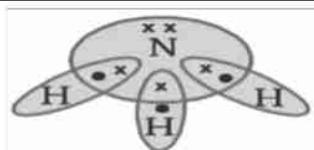
Electron dot structure Carbon dioxide Molecule.



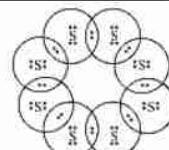
Electron dot structure Hydrogen Sulphide Molecule.



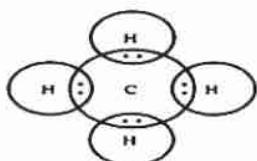
Electron dot structure Ammonia Molecule.



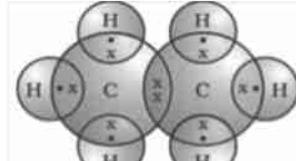
Electron dot structure Sulphur Molecule.



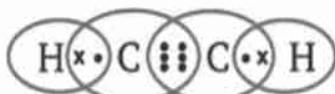
Electron dot structure Methane Molecule.



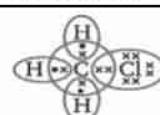
Electron dot structure Ethane Molecule.



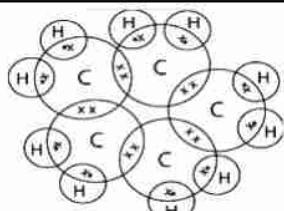
Electron dot structure Ethyne Molecule.



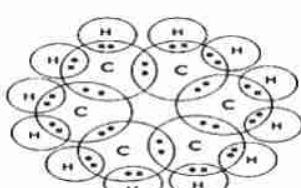
Electron dot structure Methyl chloride Molecule.



Electron dot structure Cyclopentane Molecule.



Electron dot structure Cyclo hexane Molecule.



Types of carbon compounds:

SI NO	Type of Carbon Compound	Example	General Molecular Formula	No of covalent Bonds	First member
1	Saturated	ALKNE	C_nH_{2n+2}	Single	Methane
2	Unsaturated	ALKENE	C_nH_{2n}	Double	Ethene
		ALKYNE	C_nH_{2n-2}	Triple	Ethyne

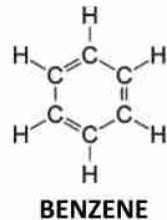
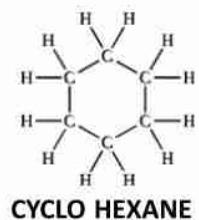
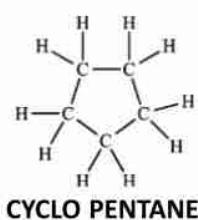
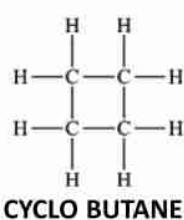
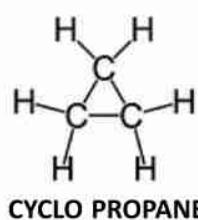
Homologous Series:

Series of organic compounds having the same functional group and chemical properties and successive members differ by a $-CH_2$ unit or 14 mass units are known as Homologous series.

Number of Carbons	Prefix	Suffix	Structural Formula	Molecular Formula
1	Meth-	ane	$H-C-H$	CH_4
2	Eth -	ane	$H-C-C-H$	C_2H_6
3	Prop -	ane	$H-C-C-C-H$	C_3H_8
4	But -	ane	$H-C-C-C-C-H$	C_4H_{10}
5	Pent -	ane	$H-C-C-C-C-C-H$	C_5H_{12}

# of Carbons	Prefix	Suffix	Structural Formula	Molecular Formula
1	N/A	N/A	N/A	N/A
2	Eth	ene	$H>C=C<H$	C_2H_4
3	Prop	ene	$H>C=C-C-H$	C_3H_6
4	But	ene	$H>C=C-C-C-H$	C_4H_8
5	Pent	ene	$H>C=C-C-C-C-H$	C_5H_{10}
6	Hex	ene	$H>C=C-C-C-C-C-H$	C_6H_{12}

# of Carbons	Prefix	Suffix	Structural Formula	Molecular Formula
2	Eth	yne	H-C≡C-H	C ₂ H ₂
3	Prop	yne	H-C≡C- $\begin{array}{c} H \\ \\ C-H \end{array}$	C ₃ H ₄
4	But	yne	H-C≡C- $\begin{array}{cc} H & H \\ & \\ C & -C-H \end{array}$	C ₄ H ₆
5	Pent	yne	H-C≡C- $\begin{array}{ccc} H & H & H \\ & & \\ C & -C & -C-H \end{array}$	C ₅ H ₈
6	Hex	yne	H-C≡C- $\begin{array}{cccc} H & H & H & H \\ & & & \\ C & -C & -C & -C-H \end{array}$	C ₆ H ₁₀

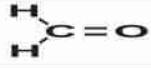
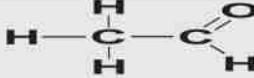
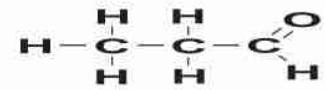
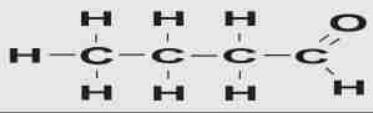
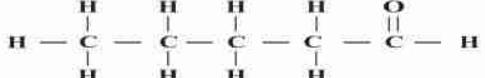


Hetero atom	Functional group	Formula of functional group
Cl/Br	Halo- (Chloro/bromo)	—Cl, —Br (substitutes for hydrogen atom)
Oxygen	1. Alcohol	—OH
	2. Aldehyde	$\begin{array}{c} H \\ \\ -C=O \end{array}$
	3. Ketone	$\begin{array}{c} \\ -C-O- \end{array}$
	4. Carboxylic acid	$\begin{array}{c} \\ O \\ \\ -C-OH \end{array}$

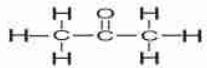
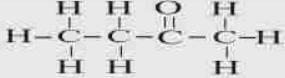
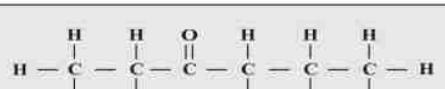
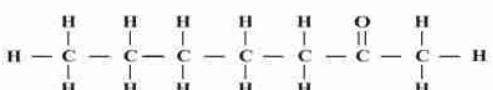
ALCOHOL

Carbon Compound	Molecular Formula	Structural Formula
Methanol	CH ₃ OH	$\begin{array}{c} H \\ \\ H-C-OH \\ \\ H \end{array}$
Ethanol	CH ₃ CH ₂ OH	$\begin{array}{cc} H & H \\ & \\ H-C & -C-OH \\ & \\ H & H \end{array}$
Propanol	CH ₃ CH ₂ CH ₂ OH	$\begin{array}{ccc} H & H & H \\ & & \\ H-C & -C & -C-OH \\ & & \\ H & H & H \end{array}$
Butanol	CH ₃ CH ₂ CH ₂ CH ₂ OH	$\begin{array}{cccc} H & H & H & H \\ & & & \\ H-C & -C & -C & -C-OH \\ & & & \\ H & H & H & H \end{array}$
Pentanol	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ OH	$\begin{array}{ccccc} H & H & H & H & H \\ & & & & \\ H-C & -C & -C & -C & -C-OH \\ & & & & \\ H & H & H & H & H \end{array}$

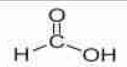
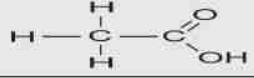
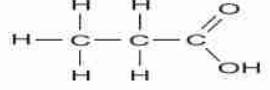
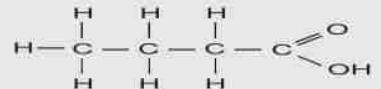
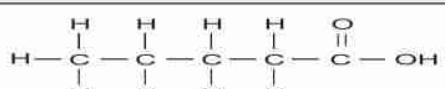
ALDEHYDE

Methanal	H-CHO	
Ethanal	CH₃-CHO	
Propanal	CH₃CH₂-CHO	
Butanal	CH₃CH₂CH₂CH₂-CHO	
Pentanal	CH₃CH₂CH₂CH₂CH₂-CHO	

KETONE

Propanone	CH₃-CO-CH₃	
Butanone	CH₃CH₂-CO-CH₃	
Pentanone	CH₃CH₂CH₂-CO-CH₃	
Hexanone	CH₃CH₂CH₂CH₂-CO-CH₃	
Heptanone	CH₃CH₂CH₂CH₂CH₂-CO-CH₃	

CARBOXYLIC ACID

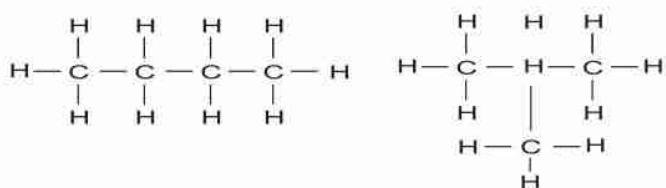
Methanoic Acid	H-COOH	
Ethanoic Acid	CH₃-COOH	
Propanoic Acid	CH₃-CH₂-COOH	
Butanoic Acid	CH₃-CH₂-CH₂-COOH	
Pentanoic Acid	CH₃-CH₂-CH₂-CH₂-COOH	

➤ Chemical Properties of Carbon Compounds:

Name of the reaction	Definition	Example
Combustion Reaction	The reaction in which methane burns in air, it gives carbon dioxide, water, heat, and light.	$\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
Oxidation Reaction:	Reactions in which alcohols are converted into carboxylic acids.	$\text{CH}_3\text{CH}_2\text{-OH} \xrightarrow[\text{Ethanol}]{\substack{\text{Alkaline KMnO}_4 + \text{Heat} \\ \text{Or Acidified K}_2\text{Cr}_2\text{O}_7 + \text{Heat}}} \text{CH}_3\text{COOH}$ Ethanol Ethanoic acid
Addition Reaction:	The reactions in which addition of hydrogen or any substitute group to unsaturated hydrocarbons are called addition reaction. Catalyst: palladium / Nickel	$\begin{array}{ccc} \text{H} & & \text{H} \\ & & \\ \text{H}-\text{C}=\text{C}-\text{H} \\ & & \\ \text{H} & & \text{H} \end{array} + \text{H}-\text{H} \xrightarrow[\text{150°C}]{\text{nichel catalyst}} \begin{array}{ccccc} \text{H} & \text{H} & & & \\ & & & & \\ \text{H}-\text{C} & -\text{C}-\text{H} & & & \\ & & & & \\ \text{H} & \text{H} & & & \end{array}$ Ethene Hydrogen Ethane unsaturated saturated
Substitution Reaction:	Substitution reaction is a reaction in which a functional group in a compound is replaced by another functional group.	$\text{CH}_4 + \text{Cl}_2 \rightarrow \text{CH}_3\text{Cl} + \text{HCl}$ (in the presence of sunlight)

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

For example: Isomers of butane (C_4H_{10})



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 particles.

* * *

BIOLOGY

1. LIFE PROCESSES

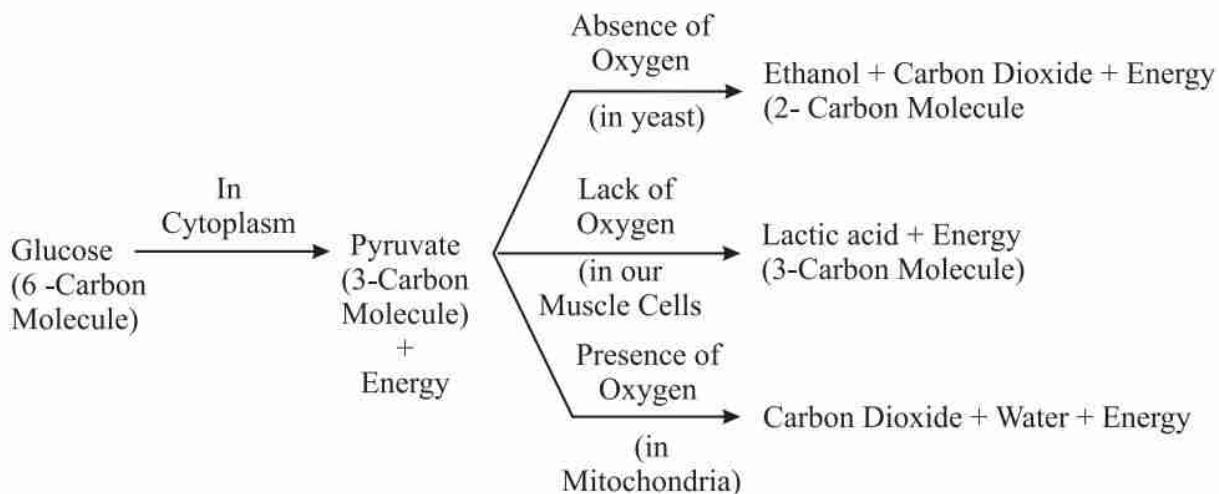
- Steps involved during the process of photosynthesis

Light Reaction	It takes place in thylakoid region of chloroplast.	➤ Absorption of light by chlorophyll molecule. ➤ Conversion of light energy to chemical energy. ➤ Splitting of water molecule into hydrogen and oxygen. ➤ Formation of ATP with the help of enzymes.
Dark Reaction	It takes place in stroma region of chloroplast.	➤ Reduction of carbon di oxide to carbohydrates.
Photosynthetic Equation	$6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow[\text{CHLOROPHYLL}]{\text{SUN LIGHT}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$	

- The following table shows the digestive process in a simple format in human beings:

Organ	Digestive juices/enzymes added		Food that is broken down into
Mouth	Salivary amylase mucus		Starch → sugar
Oesophagus	—		➤ Taking food from mouth to stomach by peristaltic movements.
Stomach	Gastric juice	PEPSIN	➤ Enzymes that breaks down proteins.
		HCl	➤ Makes medium acidic.
		MUCUS	➤ Protects inner lining of the stomach.
Small Intestine	Intestinal enzyme		➤ Carbohydrates into Glucose ➤ Proteins into amino acids ➤ Fats into fatty acid & Glycerol
	Liver		➤ Bile – it converts large fat globules into small globules.
	Pancreas		➤ Trypsin – it converts proteins into peptones. ➤ Lipase – it breaks fat molecule.
Large Intestine	---		➤ Absorb excess of water.
Anus	---		➤ The rest of the material removed.

➤ Breakdown of glucose by various pathways



➤ Write the components of blood and mention their function.

Sl. No.	Components of blood	Functions
1.	Red blood cell (RBC)	Carries respect gas (O_2 , CO_2) It contains haemoglobin.
2.	White blood cell (WBC)	Helps in Blood clotting
3.	Platelets	Provide body defence by engulfing the germs & producing antibodies.
4.	Blood plasma	A yellow colour fluid contain 90% water & 10% organic substance.

➤ Write the process of excretion in plants:

Plants use different strategies for excretion of different products:

- Oxygen and carbon dioxide is diffused through stomata.
- Excess water is removed by transpiration.
- Plants can even loose some of their old parts like old leaves and bark of tree.
- Other waste products like raisins and gums especially in old xylem cell which can also be lost by plants.
- Plants also secrete some waste substance into the soil around them.

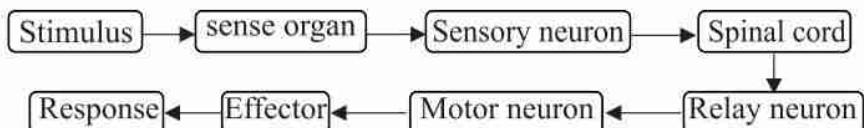
➤ Explain the process of formation of urine in the Human Kidney.

1. **Glomerular filtration:** Nitrogenous wastes, glucose water, amino acid filter from the blood into Bowman Capsule of the nephron.
2. **Tubular reabsorption:** Now, useful substances from the filtrate are reabsorbed back by capillaries surrounding the nephron.
3. **Secretion:** Urea, extra water and salts are secreted into the tubule which open up into the collecting duct & then into the ureter.

2. CONTROL AND COORDINATION

- What is a reflex arc? Write its pathway.

Is the pathway along which nerve impulse travels during the reflex action. Here is its flow chart.



- HUMAN BRAIN:

Brain is the main coordinating Centre of the body. It has three major parts:

Sl. No.	Parts of Brain	Functions
1.	Fore-brain	i) Thinking part of the brain. ii) Control the voluntary actions. iii) Store information (Memory).
2.	Mid-brain	Controls involuntary actions i) Change in pupil size. ii) Reflex movements of head, neck and trunk.
3.	Hind-brain	➤ Cerebellum: Controls posture and balance. Precision of voluntary actions e.g., Picking pen ➤ Medulla: Controls involuntary actions e.g., Blood pressure, Salivation, vomiting. ➤ Pons: Involuntary actions, regulation of respiration.

- Mention the different plant hormones write its function.

Sl. No.	Plant hormones	Function
1.	Auxin	➤ Synthesized at shoot tip. ➤ Helps the cells to grow longer. ➤ Involved in phototropism.
2.	Gibberellin	➤ Helps in the growth of the stem.
3.	Cytokinins	➤ Promotes cell division. ➤ Present in greater concentration in fruits and seeds.
4.	Abscisic acid	➤ Inhibits growth. ➤ Cause wilting of leaves.

➤ Endocrine gland, Hormone and their functions:

Sl. No.	Endocrine Gland	Hormone	Location	Functions
1	Pituitary	Growth hormone	Hypothalamus of mid brain	➤ Regulates growth and development.
2	Thyroid	Thyroxine	Throat region	➤ Regulation of metabolism of carbohydrates, fats and proteins.
3	Adrenal	Adrenaline	Above both kidneys	➤ Regulation of blood pressure, heart beat, carbohydrate metabolism during emergency situation.
4	Pancreas	Insulin	Below stomach	➤ Reduces and regulates blood sugar level.
5	Testis	Testosterone	Lower abdomen	➤ Changes associated puberty. ➤ Maintain secondary sexual characters in males.
6	Ovaries	Estrogen	Lower abdomen	➤ Changes associated puberty. ➤ Maintain secondary sexual characters in females.

➤ Hormonal deficiency disorders:

Sl. No.	Hormonal Disorder	Causes	Remedies
1	Dwarfism	Deficiency of growth hormone in childhood leads to dwarfism.	Hormone therapy
2	Gigantism	Excess secretion growth hormone leads to gigantism.	Hormone therapy
3	Simple goiter	Swelling of thyroid gland in neck due to deficiency of thyroxine.	Taking of iodine rich food.
4	Diabetes	Blood sugar level increase due to deficiency of insulin.	Taking injection of insulin hormone.

3. OUR ENVIRONMENT

➤ FOOD CHAIN AND FOOD WEBS:

The sequence in which living organisms in a community consume each other to transfer food energy is called a food chain.

In ecology, the **Trophic level** is the position that an organism occupies in a food chain - what it eats and what eats it.

Autotrophs are the **Producers** in a food chain, such as plants on land and algae water.

➤ FOOD CHAIN:

- Food chain is a series of organisms in which one organism eats another organism as food. For e.g.,

Grass → Deer → Lion

- In a food chain various steps where transfer of energy takes place is called a trophic level.

➤ Flow of energy between trophic levels

- Flow of energy in a food chain is unidirectional
- Carrots → Rabbit → Snake → Eagle.
- Grass → earthworm's → bird → snake.

➤ FOOD WEB:

In natural large numbers of food chains are interconnected forming a food web.

A Food web is a network of interconnected food chains. It shows the energy flow through part of an ecosystem.

- Oak tree → squirrel → fox

➤ 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 (O_3) is a molecule, made up of three atoms of oxygen. Ozone (O_3) 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?**

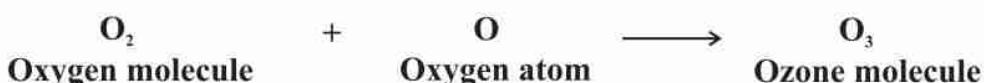
Ozone layer absorbs the harmful UV radiations of the sunlight, so this layer is very important for the survival and existence of life on earth.

- **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.



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



4. HOW DO ORGANISMS REPRODUCE?

➤ **Modes of asexual reproduction:**

Sl. No.	Modes of Asexual	Definition	Example
1.	FISSION ➤ Binary Fission: ➤ Multiple fission	Parent cell divides into two daughter cells. Parent cells divide into many cells.	➤ Amoeba ➤ plasmodium
2.	Fragmentation	The organism breaks up into many pieces upon maturation, each piece develop into new individual.	Spirogyra
3.	Regeneration	If organism is somehow cut or broken into many pieces, each piece grows into a complete organism.	Planaria Hydra
4.	Budding	A bud is formed which develops into tiny individual. Detaches from parent body.	Hydra Yeast
5.	Spore formation	Spores are small bulb like structures which are covered by thick walls. Under favorable conditions, they germinate and produce new organism.	Rhizopus Bread mold
6.	Vegetative propagation	In many plants, new plants develops from vegetative parts such as: ➤ By Roots: ➤ By Stem: ➤ By Leaves:	Sweet potato Potato, Ginger Bryophyllum
7	Artificial method ➤ Grafting: ➤ Cutting: ➤ Layering: ➤ Tissue culture:	Advanced technique to add living tissue from one plant to another Vascular tissue. plant section originating from stem, leaf, or root and capable of developing into a new plant. First the roots are formed on a stem of a mother plant and only after that the stem is cut off and is planted as a new plant. Tissue culture is the growth of tissues or cells in an artificial medium separate from the parent organism.	Mango Rose Jasmine Ornamental plants Orchid

➤ **Reproduction in higher plants:**

Sl. No.	Parts of Flower	Commonly Known	Function Of Each Part
1	Calyx	Sepals	Protects flower while in bud.
2	Corolla	Petals	It is coloured and to attract insects
3	Androecium	Stamen (male part) <ul style="list-style-type: none"> ➤ Anther: ➤ Filament: 	Contain pollen sac, forms pollen grains. Its supports to anther.
4	Gynoecium	Pistil (female part) <ul style="list-style-type: none"> ➤ Stigma: ➤ Style: ➤ Ovary: 	It receives pollen grains from the anther. Link stigma and ovary. Contains ovules & site of fertilization.

REPRODUCTION IN HUMAN BEINGS:

➤ **What are the changes at puberty in boys and girls:**

BOYS	<ul style="list-style-type: none"> ➤ Thick hair grown in armpits and genital area. ➤ Skin becomes oily, may result in pimple. ➤ Thick hair growth on face. ➤ Voice begins to crack.
GIRLS	<ul style="list-style-type: none"> ➤ Thick hair grown in armpits and genital area. ➤ Skin becomes oily, may result in pimple. ➤ Breast size begins to increase. ➤ Girls begin to menstruate.

- **How does the embryo get nourishment inside the mother's body OR Explain role of placenta?**
- ❖ 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 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.

➤ **Human male reproductive system:**

Sl. No.	Part	Function
1.	Testes	Male germ cell that is sperms are produced. It releases testosterone hormone.
2.	Vas deferens	It passes sperms from testes up to urethra.
3.	<ul style="list-style-type: none"> • Prostate gland • Seminal vesicles 	<ul style="list-style-type: none"> ➤ It adds secretion to the sperms to nourish the sperms and make their transport easy. ➤ To store sperms and to secrete seminal fluid that makes the sperm active.
4.	Penis	The function of the penis is to deliver semen into the vagina during sexual intercourse.

➤ **Human female reproductive system:**

Sl. No.	Part	Function
1.	Ovary	It produces female gametes i.e. eggs. It releases oestrogen hormone. One egg is produced every month by one of the ovaries.
2.	Fallopian tube / oviduct	Receives egg from ovary and transfer to uterus. It is the site of fertilisation.
3.	Uterus	It is bag like structure where development of the baby takes place.
4.	Vagina	To carry menstrual fluid out of the body . It provides a passageway for the birth canal at the time of parturition. It also receives the penis and ejaculate, assisting in its transport to the uterus.

➤ **Sexually Transmitted Diseases (STD)**

- **Bacterial disease :** Gonorrhoea and syphilis
- **Viral disease :** Genital warts and HIV-AIDS

What are the different methods of contraception?

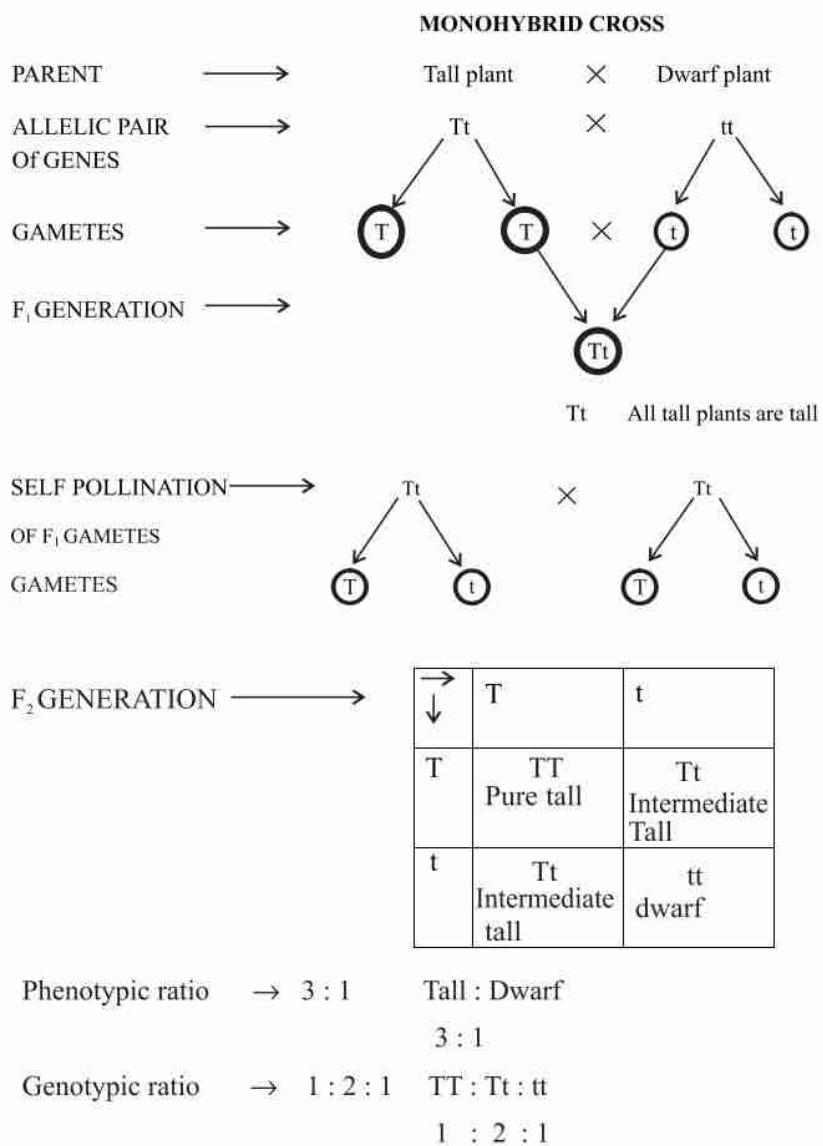
Sl. No.	Contraceptive Method	Role of this method	Tools used for This method
1.	Physical Barrier	To prevent union of egg and sperm.	Condoms, cervical caps
2.	Chemical Method	Change hormonal balance of body so that eggs are not released.	Oral pills
3.	Intra uterine Contraceptive Device (IUCD)	It is inserted into the uterus to prevent union of egg and sperm.	Copper-T
4.	Surgical Methods ➤ Vasectomy ➤ Tubectomy	In males, the vas deferens is blocked to prevent sperm transfer. In females, the fallopian tube is blocked to prevent egg transfer.	Surgery Surgery

5. HEREDITY

1) MONOHYBRID CROSS :

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

Example: Cross between a tall and a dwarf plant (short).



➤ Observations of Monohybrid Cross

- All F₁ progeny were tall, no medium height plant.
- F₂ progeny $\frac{1}{4}$ were short, $\frac{3}{4}$ were tall.
- Phenotypic ratio F₂ – 3 : 1 (3 tall : 1 short)

➤ Conclusions

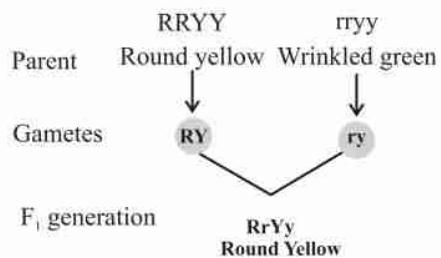
- Characters/traits like 'T' are called dominant trait and 't' are recessive trait

2. DI HYBRID CROSS :

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 dihybrid cross with the help of a checkerboard. Mention the varieties of plants obtained in F_2 generation.

A cross between two plants having two pairs 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 yellow	Rryy Round yellow
ry	RrYy Round yellow	rrYy Wrinkled yellow	Rryy Round yellow	rryy Wrinkled yellow

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

Round yellow - 9

Round green - 3

Wrinkled yellow - 3

Wrinkled green - 1

Observation:

- When $RRyy$ was crossed with $rrYY$ in F_1 generation all were $RrYy$ round and yellow seeds.
- Self-pollination of F_1 plants gave parental phenotype and two mixtures seeds plants in the ratio of 9:3:3:1.

Conclusions:

- Round and yellow seeds are Dominant characters.
- Occurrence of new phenotype combinations show that genes for round and yellow seeds are inherited independently of each other.

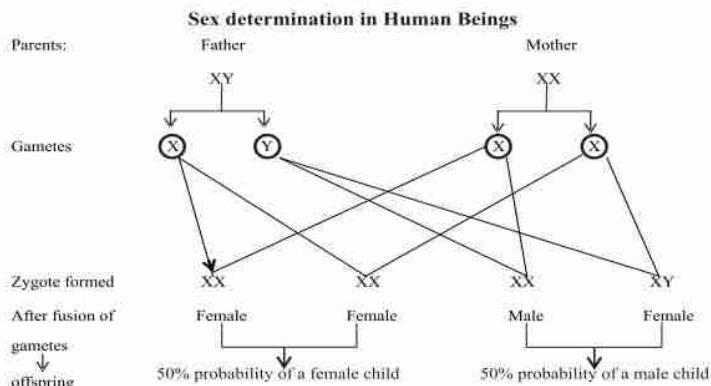
3. SEX DETERMINATION

Sex chromosomes :

In human beings, there are 23 pairs of chromosome. Out of these 22 chromosomes pairs are called autosomes and the last pair of chromosome that help in deciding gender of that individual is called sex chromosome.

XX- Female

XY- Male



PHYSICS

SSLC BOARD PAPERS

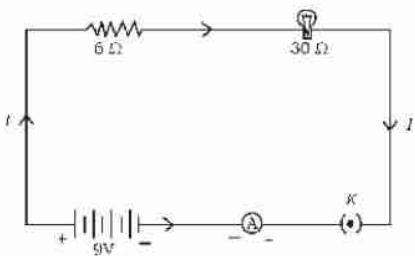
MULTIPLE CHOICE QUESTIONS

1. An object is kept at the centre of curvature of a concave mirror. The position and nature of the image formed is (APRIL 2020)

(A) between F and C and inverted (B) behind the mirror and erect
(C) between F and P and erect (D) at the centre of curvature and inverted.

Ans: (D) at the centre of curvature and inverted.

2. An electric lamp whose resistance is $30\ \Omega$ and a conductor of $6\ \Omega$ resistance are connected in series to 9V battery as shown in the figure. The total current flowing in the circuit is (JULY 2021)



(A) 4A (B) 36A (C) 0.25A (D) 0.6A

Ans: (C) 0.25A

3. The metal used in the filament of an electric bulb is (JULY 2021)

(A) manganese (B) tungsten
(C) nickel (D) chromium

Ans: (B) tungsten

4. The focal length of a lens is + 0.50 m. The power of the lens and type are (JULY 2021)

(A) + 2.0 D and convex lens (B) + 2.0 D and concave lens
(C) - 2.0 D and concave lens (D) - 2.0 D and convex lens

Ans: (A) + 2.0 D and convex lens

5. A device used to change the resistance in the electric circuit is (JULY 2021)

(A) voltmeter (B) ammeter
(C) galvanometer (D) rheostat

Ans: (D) rheostat

6. The magnetic field lines inside a solenoid are in the form of parallel straight lines. The reason for this is, the magnetic field inside the solenoid is (JULY 2021)

(A) very high (B) uniform
(C) zero (D) produced by electric current

Ans: (B) uniform

7. The nature and the size of the image formed when an object is kept between the principal focus F_1 and optical centre O of a convex lens are (JULY 2021)

(A) virtual, erect and enlarged (B) real, inverted and small size
(C) virtual, inverted and small size (D) real, inverted and enlarged

Ans: (A) virtual, erect and enlarged

8. 'Ohm' is the SI unit of (JULY 2021)

(A) electric potential difference (B) resistance
(C) electric current (D) electric charge

Ans: (B) resistance

9. Observe the following table : (JULY 2021)

Material medium	Refractive index
P	1.52
Q	1.44
R	2.42
S	1.33

In which material medium the speed of light is very high ?

(A) Q (B) P
(C) S (D) R

Ans: (C) S

10. One property of a convex lens among the following is that, it (JULY 2021)

(A) diverges the light rays (B) is thicker at the edges and thinner at the middle
(C) forms real and erect image (D) is thinner at the edges and thicker at the middle

Ans: (D) is thinner at the edges and thicker at the middle

11. The SI unit of electric potential difference is (SEP 2021)

(A) volt (B) ampere
(C) ohm (D) coulomb

Ans: (A) volt

12. The resistance of an electric heater coil is $110\ \Omega$. Then electric current, that an electric heater draws from a 220 V source is, (SEP 2021)

(A) 0.5 A (B) 0.11 A
(C) 2 A (D) 3 A

Ans: (C) 2 A

13. If the power of a lens is -2.5 D , the focal length of the lens and type is (SEP 2021)

(A) $+0.40\text{ m}$ and convex lens (B) -0.40 m and convex lens
(C) $+0.40\text{ m}$ and concave lens (D) -0.40 m and concave lens

Ans: (D) -0.40 m and concave lens

14. One property of concave lens among the following is, that (SEP 2021)

- (A) it converges the light rays
- (B) is thicker at the edges and thinner at the middle
- (C) is thinner at the edges and thicker at the middle
- (D) it forms real and inverted image

Ans : (B) is thicker at the edges and thinner at the middle

15. Which of the following is 'NOT' a property of magnetic field lines? (SEP 2021)

- (A) Magnetic field lines are dense near the poles
- (B) Magnetic field lines are closed loops
- (C) Magnetic field lines intersect each other
- (D) Magnetic field lines emerge from north pole and merge at the south pole

Ans: (C) Magnetic field lines intersect each other

16. A device that is connected in series in an electric circuit is (SEP 2021)

- | | |
|---------------|----------------|
| (A) voltmeter | (B) bar magnet |
| (C) turbine | (D) ammeter |

Ans: (D) ammeter

17. Observe the following table: (SEP 2021)

Material	Resistivity (Ωm)
K	2.63×10^{-8}
L	5.20×10^{-8}
M	1.60×10^{-8}
N	6.84×10^{-8}

The best conductor of electricity among these materials is

- (A) N
- (B) M
- (C) K
- (D) L

Ans: (B) M

18. If an image is to be formed between F_2 and $2F_2$ in a convex lens, then the object should be placed [F_1 : principal focus of a lens] (SEP 2021)

- (A) beyond $2F_1$
- (B) at $2F_1$
- (C) between F_1 and $2F_1$
- (D) at focus F_1

Ans: (A) beyond $2F_1$

19. The distance between the principal focus and the optical centre of a lens is (SEP 2021)

- (A) principal axis
- (B) object distance
- (C) image distance
- (D) focal length

Ans: (D) focal length

20. The function of fuse in an electric circuit is that, it (SEP 2021)

- (A) reverses the direction of an electric current
- (B) shows the direction of motion of the electric current
- (C) measures the potential difference
- (D) protects the electrical appliances

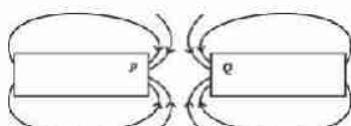
Ans: (D) protects the electrical appliances

21. The sky as seen from the surface of the moon appears dark because, (SEP 2020)

- (A) only a little of the blue and violet colours are scattered
- (B) all the colours are absorbed by the atmosphere present in the moon
- (C) all the colours are scattered
- (D) atmospheric particles needed to scatter the light are not present.

Ans: (D) atmospheric particles needed to scatter the light are not present.

22. Observe the diagram. (SEP 2020)

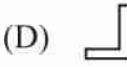


The magnetic poles represented by P and Q respectively are

- (A) south (S) and south (S)
- (B) north (N) and south (S)
- (C) north (N) and north (N)
- (D) south (S) and north (N).

Ans: (A) south (S) and south (S)

23. The image of the English letter L in convex mirror looks like (SEP 2020)

- (A) 
- (B) 
- (C) 
- (D) 

Ans. : (B) 

24. The correct formula that shows the relationship between potential difference, electric current and resistance in an electric circuit is (APRIL 2022)

- (A) $I = \frac{R}{V}$
- (B) $I = VR$
- (C) $V = \frac{I}{R}$
- (D) $R = \frac{V}{I}$

Ans. : (D) $R = \frac{V}{I}$

25. To get diminished and real image of an object from a convex lens, the object should be placed (APRIL 2022)

- (A) at principal focus F₁
- (B) between principal focus F₁ and 2F₁
- (C) beyond 2F₁
- (D) between principal focus F₁ and optical centre O.

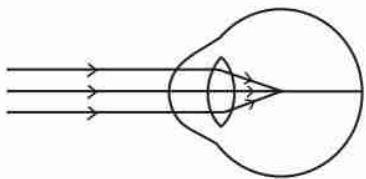
Ans. : (C) beyond 2F₁

26. The device used to measure the rate of current in a circuit is (APRIL 2023)

- (A) Ammeter
- (B) Voltmeter
- (C) Galvanometer
- (D) Battery

Ans. : (A) Ammeter

27. Observe the given figure. Identify the eye defect indicated in this figure. (APRIL 2023)



- (A) Presbyopia (B) Hypermetropia
(C) Myopia (D) Cataract

Ans. : (C) Myopia

28. A light ray enters to rarer medium from a denser medium. Then the speed of that light ray (APRIL 2023)

- (A) decreases and bends towards the normal
(B) increases and bends away from the normal
(C) decreases and bends away from the normal
(D) increases and bends towards the normal

Ans.: (B) increases and bends away from the normal

29. A mirror forms an erect and enlarged image of an object. Then the type of the mirror and the nature of the image respectively are (JULY 2023).

- (A) convex mirror and virtual image (B) concave mirror and real image
(C) plane mirror and real image (D) concave mirror and virtual image.

Ans: (D) concave mirror and virtual image

30. Imagine, you are holding a straight current carrying conductor as per the right hand thumb rule. If the thumb is upward, then the direction of the field lines of the magnetic field is (JULY 2023)

- (A) downward (B) upward
(C) anti-clockwise (D) clockwise.

Ans. :(C) anti-clockwise

31. The correct statement among the following related to the concave lens is (JULY 2022)

- (A) converges the light rays
(B) diverges the light rays
(C) forms inverted image
(D) forms real image.

Ans. : (B) diverges the light rays

32. The SI unit of resistivity is (JULY 2022)

- (A) ohm
(B) volt
(C) watt
(D) ohm-metre.

Ans. : (D) ohm-metre

ONE MARKS QUESTIONS

1. An iron ring is to be coated with copper. How can we do this without using electricity? (APRIL 2020)

An Iron ring can be coated into copper without electricity by galvanization. Galvanization is the method to apply a protective coating of zinc to iron and steel.

2. What is the SI unit of potential difference? Name the device used to measure the potential difference. (APRIL 2020)

➤ Volt ➤ Voltmeter

3. A student sitting in the last bench has difficulty in reading the blackboard writing. Which is the defect of vision the student has? How can it be corrected? (SEP 2020)

➤ The student is suffering from Myopia.
➤ This defect is corrected by using a concave lens of suitable power.

4. Suggest any two measures to avoid overloading in domestic circuits. (SEP 2020)

➤ Live and neutral wires should not come into direct contact.
➤ There should not be any short-circuit in the circuit.
➤ Too many appliances should not be connected to a single socket.
➤ Should always use quality wires and good quality electrical appliances.

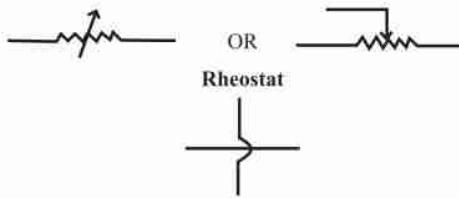
5. Magnetic field lines do not intersect each other. Why? (APRIL 2022)

At the point of intersection the compass needle would point towards two directions which is not possible

6. Mention the SI unit of power of lens. (APRIL 2022)

dioptrē

7. Write the symbols of the following components used in an electric circuit. (APRIL 2023) (JUNE 2023)



- i) Rheostat
ii) Wires crossing without joining

8. What does the thumb indicate in the right hand thumb rule? (APRIL 2023)

Direction of current

9. Calculate the power of convex lens with a focal length of +0.5 m. (JULY 2022)

Focal length (f) = +0.5m

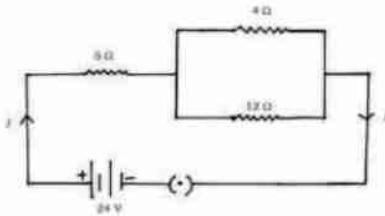
$$\text{Power of lens} = \frac{1}{\text{focal length}} = P = \frac{1}{f} \quad P = \frac{1}{0.5} = P = +2D$$

10. What are the reasons for occurring overload in an electric circuit? (JULY 2022)

➤ Accidental hike in the supply voltage
➤ Connecting too many appliances to a single socket
➤ When live wire and neutral wire come into direct contact.

TWO MARKS QUESTIONS

- The resistivity of manganese wire of length 1 m is $1.84 \times 10^{-6} \Omega \text{ m}$ at 20°C . If the diameter of the wire is $3 \times 10^{-4} \text{ m}$, what will be the resistance of the wire at that temperature? (APRIL 2020)
- Observe the given circuit diagram: (SEP 2020)



Calculate the total resistance and the total current flowing through the circuit.

Ans:

* Here, $R_1 = 5 \Omega$, $R_2 = 4 \Omega$, $R_3 = 12 \Omega$, $V = 24 \text{ V}$.

Total resistance of the circuit $R_T = ?$

Total current flowing through the circuit, $I = ?$

OR

Total resistance of the circuit, $R_T = R_1 + \left[\frac{1}{R_2} + \frac{1}{R_3} \right]$ $= R_1 + \left[\frac{R_2 \times R_3}{R_2 + R_3} \right]$ $= 5 \Omega + \left[\frac{4\Omega \times 12\Omega}{4\Omega + 12\Omega} \right]$ $= 5 + \frac{48}{16}$ $= 5 + 3$ $\therefore R_T = 8 \Omega$	Total resistance of the circuit, $R_T = R_1 + \left[\frac{1}{R_2} + \frac{1}{R_3} \right]$ $= 5 \Omega + \left[\frac{1}{4\Omega} + \frac{1}{12\Omega} \right]$ $= 5 + \left[\frac{3+1}{12} \right]$ $= 5 + \frac{4}{12}$ $= 5 + \frac{1}{3}$ $= 5 + 3$ $\therefore R_T = 8 \Omega$
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* Total current flowing through the circuit, $I = \frac{V}{R_T}$
 $= \frac{24V}{8\Omega}$
 $\therefore I = 3A$

- An object is placed at 25 cm in front of a concave mirror of focal length 15 cm. At what distance from the mirror should a screen be placed in order to obtain a sharp image? (APRIL 2022)

$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$$

$$\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{-15} - \frac{1}{-25}$$

$$\frac{1}{v} = \frac{-5+3}{75} = \frac{-2}{75}$$

$$v = \frac{75}{-2} = -37.5 \text{ cm}$$

- A concave lens has focal length of 15 cm. At what distance should the object from the lens be placed so that it forms an image at 10 cm from the lens? (APRIL 2022)

$$\frac{1}{v} \quad \frac{1}{u} \quad \frac{1}{f}$$

$$\frac{1}{u} \quad \frac{1}{v} \quad \frac{1}{f} \quad \frac{1}{-10} \quad \frac{1}{-15}$$

$$\frac{1}{u} = \frac{-3+2}{30} = \frac{-1}{30}$$

$$u = -30 \text{ cm}$$

The object is placed at a distance of 30 cm from the concave lens.

5. Light enters from air to benzene having refractive index 1.50. Calculate the speed of light in benzene. (Speed of light in air: 3×10^8 ms $^{-1}$) (APRIL 2023)

Refractive Index of a medium =

$$\frac{\text{Speed of light in air}}{\text{Speed of light in Benzene}}$$

OR

$$n_m = \frac{C}{V}$$

$$1.50 = \frac{3 \times 10^8}{\text{Speed of light in Benzene}}$$

$$1.50 \times \text{Speed of light in Benzene} = 3 \times 10^8$$

$$\text{Speed of light in Benzene} = \frac{3 \times 10^8}{1.50}$$

$$\text{Speed of light in Benzene} = 2 \times 10^8 \text{ ms}^{-1}$$

6. A concave lens has focal length of 12 cm. At what distance should the object from the lens be placed so that it forms an image at 9 cm from the lens? (APRIL 2023)

$$f = -12 \text{ cm}$$

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

$$v = -9 \text{ cm}$$

$$\frac{1}{u} = \frac{1}{v} - \frac{1}{f}$$

$$u = ?$$

$$\frac{1}{u} = \frac{1}{-9} - \frac{1}{-12}$$

$$\frac{1}{u} = -\frac{1}{9} + \frac{1}{12}$$

$$\frac{1}{u} = \frac{-4+3}{36}$$

$$\frac{1}{u} = \frac{-1}{36} \quad -u = 36 \quad u = -36 \text{ cm}$$

7. 1000 J of heat is produced each 2 seconds in a 5Ω resistor. Find the potential difference across the resistor. (JULY 2023)

$$H = 1000 \text{ J}$$

$$= \sqrt{\frac{1000 \text{ J}}{5 \Omega \times 2 \text{ s}}} = \sqrt{\frac{1000}{10}}$$

$$R = 5 \Omega$$

$$t = 2 \text{ seconds}$$

$$I = 10 \text{ A}$$

$$V = ?$$

$$H = I^2 Rt$$

Potential difference across the resistor

$$\therefore I = \sqrt{\frac{H}{Rt}}$$

$$V = OR$$

$$= 10 \times 5$$

$$V = 50 \text{ V}$$

8. A wire of given material having length 'l' and area of cross section 'A' has a resistance of '4 Ω'. Find the resistance of another wire of the same material having length l/2 and area of cross-section '2A'. (JULY 2023)

For first wire

$$R_1 = \rho \frac{l}{A} = 4 \Omega$$

Now for second wire

$$\begin{aligned} R_2 &= \rho \frac{\frac{l}{2}}{2A} \\ &= \frac{l}{4} \cdot \rho \frac{l}{A} \\ R_2 &= \frac{l}{4} \cdot R_1 \end{aligned}$$

∴ The resistance of the another wire is

$$\frac{l}{4} \cdot 4 \Omega = 1 \Omega$$

9. An electric bulb with a resistance of 50 Ω is connected to 10 V battery in an electric circuit. Calculate the electric current flowing through the electric bulb and electric power of the bulb. (JULY 2022)

$$R = 50 \Omega$$

$$V = 10 \text{ V}$$

$$I = ?$$

$$P = ?$$

$$V = IR$$

$$I = \frac{V}{R}$$

$$= \frac{10}{50}$$

$$= 0.2 \text{ A}$$

Electric current flowing through bulb is 0.2 A

$$P = VI$$

$$P = 10 \times 0.2$$

$$P = 2 \text{ W}$$

Power of bulb = 2 watt = 2 W

THREE MARKS QUESTIONS:

1. An object is kept on the principal axis of a concave mirror of focal length 12 cm. If the object is at a distance of 18 cm from the mirror, calculate the image distance. Determine the nature of the image formed by calculating the magnification produced by the mirror. (APRIL 2020)
2. A doctor prescribes a corrective lens of power -0.5 D to a person. Find the focal length of the lens. Is this lens diverging or converging? Give reason. How does the property of this lens can be used to correct eye defects? (APRIL 2020)
3. a) State the laws of refraction of light. (SEP 2020)

Laws of refraction of light :

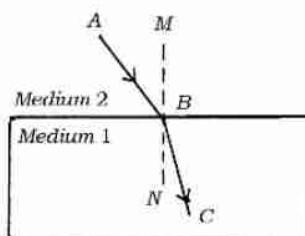
The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence, all lie in the same plane.

The ratio of sine of angle of incidence to the sine of angle of refraction is a constant for the light of a given colour and for the given pair of media.

OR

If i is the angle of incidence and r is the angle of refraction, then, $\sin i / \sin r = \text{constant}$.

- b) In the given figure, AB is the incident ray, BC is the refracted ray and MN is the normal at the point of incidence. Which medium is more denser? Why? (SEP 2020)



- Medium 1 is more denser.
 - When a ray of light travels from rarer medium to denser medium, it always bends towards the normal.
4. a) Differentiate between convex mirror and concave mirror (SEP 2020)

Convex mirror	Concave mirror
Reflecting surface is curved outwards	Reflecting surface is curved inwards
Always forms virtual and erect images	Forms real and inverted images. (Except the case when object is kept between P and F)
	
Diverges the light rays	Converges the light rays.

- b) Define the principal focus of a convex lens. (SEP 2020)

The rays of light falling on a convex lens parallel to the principal axis, after refraction from the lens converge to a point on the principal axis. This point on principal axis is called the 'principal focus' of the convex lens.

5. Which element is used in making solar cell ? Write any four advantages of solar cells. (APRIL 2022)

- ❖ Silicon/Si

The advantages of solar cells:

- ❖ They have no moving parts little maintenance.
- ❖ Work quite satisfactorily without the use of any focusing device.
- ❖ Can be set up in remote areas where people cannot reach easily.
- ❖ Can set up in those areas too, where laying of power transmission line is not possible.

6. What are the functions of an earth wire? It is necessary to connect the electric appliances having metallic body to earth wire in domestic electric circuit. Why? Explain. (APRIL 2022)

Functions of the earth wire :

- ❖ This is used as a safety measure for appliances have metallic body in domestic circuit.
- ❖ This provides a low resistance conducting path for the current.
- ❖ Any leakage of current in the appliances keeps its potential to that of the earth and the user may not get a severe electric shock.

7. Explain Faraday's experiment related to electromagnetic induction. Mention the difference between direct and alternate current. (APRIL 2022)

- ❖ Take a coil of copper wire having a large number of turns connect the ends of the coil to a galvanometer.
- ❖ Take a strong magnet and move its one pole into the coil.
- ❖ There is a deflection in the needle of the galvanometer. This indicates the presence of a current in the coil.
- ❖ Likewise, when the magnet is withdrawn back then also the needle of galvanometer deflects and this indicates the presence of electric current.

Direct Current	Alternating current
Direct current flows in one direction.	Periodically alternating current reverse its direction.

8. State Ohm's law. On which factors does the resistance of a conductor depend ? Mention the SI unit of electric power. (APRIL 2023) (APRIL 2020)

At constant temperature, the potential difference (V), across the ends of a given metallic wire in an electric circuit is directly proportional to the current flowing through it.

$$V \propto I \quad V = IR$$

The factors on which resistance of a conductor depends:

- i) The length of the conductor
- ii) Area of cross-section of the conductor
- iii) The nature of the material
- iv) The temperature.

❖ watt – W

9. State Joule's law of heating. How is fuse connected in the circuits? Name the metal used in the filament and the gas filled in electric bulb. (APRIL 2023) (APRIL 2020).

Heat produced in a resistor is

- i) directly proportional to the square of current for a given resistance,
- ii) directly proportional to resistance for a given current, and
- iii) directly proportional to the time for which the current flows through the resistor

$$H = I^2 R t$$

Filament: Tungsten

Gases filled: Nitrogen/N₂ OR Argon/Ar (He/Ne/Kr)

10. The resistors R₁, R₂ and R₃ have the values 10 Ω, 20 Ω and 60 Ω respectively, which have been parallelly connected to a battery of 24 V in an electric circuit. (APRIL 2023)

Then calculate the following :

- i) The current flowing through each resistor
- ii) The total current in the circuit
- iii) The total resistance of the circuit.

$$\text{i)} \quad I_1 = \frac{V}{R_1} = \frac{24 \text{ V}}{10 \Omega} = 2.4 \text{ A}$$

$$I_2 = \frac{V}{R_2} = \frac{24 \text{ V}}{20 \Omega} = 1.2 \text{ A}$$

$$I_3 = \frac{V}{R_3} = \frac{24 \text{ V}}{60 \Omega} = 0.4 \text{ A}$$

$$\text{ii)} \quad I = I_1 + I_2 + I_3$$

$$= (2.4 + 1.2 + 0.4) \text{ A}$$

$$= 4 \text{ A}$$

$$\text{iii)} \quad \frac{1}{R_p} = \frac{1}{10} + \frac{1}{20} + \frac{1}{60} = \frac{1}{6}$$

$$\frac{1}{R_p} = \frac{1}{6}$$

$$R_p = 6 \Omega.$$

11. What is meant by the 'aperture' of a spherical mirror? Mention the four uses of a concave mirror. (JULY 2023)

- The diameter of the reflecting surface of spherical mirror.
- Used in torches, search-lights and vehicle head lights to get parallel beam of light
- as a shaving mirror
- by dentists to see large images of the teeth
- in solar furnaces to concentrate sunlight

12. a) What is meant by the power of a lens? Write the formula used to find the power of a lens. What is the SI unit of power of a lens? (JULY 2023)

The degree of convergence or divergence of light rays is the power of a lens

$$P=1/f$$

b) If the focal lengths of two lenses A and B are + 0.50 m and - 0.40 m respectively. Mention the types of these lenses in the same order. (JULY 2023)

- SI unit of power of a lens is 'dioptre'. OR 'D'
- + 0.50 m → Convex lens
- - 0.40 m → Concave lens

13. a) State the two laws of refraction of light. (JULY 2022)

Laws of refraction.

- i) The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence all lie in the same plane.
 - ii) The ratio of sine of angle of incidence to the sine of angle of refraction is a constant for the light of a given colour and for the given pair of media
- b) "The refractive index of diamond is 2.42." Write the meaning of this statement. (JULY 2022)**

The ratio of the speed of light in air and the speed of light in diamond is 2.42.

14. List the properties of the magnetic field due to the flow of electric current in a solenoid. What are the two methods of increasing magnetic field in a solenoid? (JULY 2022)

The magnetic field in a current carrying solenoid is similar to that of magnetic field produced in a bar magnet.

The magnetic field is uniform inside the solenoid.

The two methods to increase magnetic field in a solenoid.

- i) By increasing the number of turns of the coil.
- ii) By increasing the current flowing through solenoid.

FOUR MARKS QUESTIONS:

1. **What is the meaning of the statement “The potential difference between two points is 1 V”? Name the device used to measure potential difference. What is resistance of a conductor? What is electric power? Write three formulae used to find it. (SEP 2020)**

If 1 Joule (1J) of work is done to move a charge of 1 Coulomb (1 C) from one point to another point in a current carrying conductor, the potential difference between the two points is 1 volt (1 V).

The device used to measure it is voltmeter.

The property of a conductor to restrain or to retard the motion of electric charges flowing through it is called resistance of a conductor.

The rate at which electric energy is dissipated or consumed in an electric circuit is called electric power.

Three formulae used to find electric power are.

$$\rightarrow P = VI \quad \text{or} \quad P = IV / \quad P = \frac{W}{t}$$

$$\rightarrow P = I^2 R$$

$$\rightarrow P = \frac{V^2}{R}$$

2. a) **What are the advantages of connecting electrical devices in parallel in an electric circuit instead of connecting them in series? (APRIL 2022)**

Advantages of connecting electrical devices in parallel are :

- The parallel circuit divides current through the electrical gadgets.
- When one component fails, the circuit does not fail
- The total resistance in parallel circuit decreases, so that
- Electrical gadgets get current as per their resistance required

- b) **How are ammeter and voltmeter connected in an electric circuit ? What are their function? (APRIL 2022)**

- In an electrical circuit ammeter is connected in series.
- In an electrical circuit voltmeter is connected in parallel.
- Ammeter measures the rate of electric current in a circuit.
- Voltmeter measures the potential difference across the ends of a conductor.

3. a) **What is solenoid? Write the properties of the magnetic field lines formed around a current carrying solenoid. (APRIL 2023)**

- A coil of many circular turns of insulated copper wire wrapped closely in the shape of a cylinder is called a solenoid.
- At the ends/poles of a solenoid, the magnetic field lines appear in the form of concentric circles.
- At the centre / inside the solenoid the magnetic field lines appear in the form of parallel straight lines.

4. a) A bread-toaster rated 350 W is used for 15 hours a day. An electric iron box rated 250 W is used for 5 hours a day. Calculate the cost of using these appliances for 30 days, if the cost of 1 kWh is Rs. 4. (JULY 2023)

The energy consumed by the bread-toaster in 30 days

$$= 350 \text{ W} \times 15 \text{ hours} \times 30 \text{ days} \quad \frac{1}{2}$$

$$= 157500 \text{ Wh}$$

$$= 157.5 \text{ kWh} \quad \frac{1}{2}$$

The energy consumed by the iron box in 30 days

$$= 250 \text{ W} \times 5 \text{ hours} \times 30 \text{ days} \quad \frac{1}{2}$$

$$= 37500 \text{ Wh}$$

$$= 37.5 \text{ kWh} \quad \frac{1}{2}$$

The total cost of energy at the rate of Rs. 4.00 for 1 kWh for 30 days.

$$= (157.5 + 37.5) \text{ kWh} \times 4 \quad \frac{1}{2}$$

$$= 195 \times 4$$

$$= \text{Rs. } 780 \quad \frac{1}{2}$$

- b) In which method the resistors R₁ and R₂ could be connected so that the equivalent resistance of that electric circuit becomes low? What is the change in the value of current in the circuit by this type of connection? (JULY 2023)

Parallel connection

The value of the current increases

5. a) Write any four uses of concave mirror. (JULY 2022)

Uses of concave mirror

- i) Used in torches, search-lights
- ii) Used in vehicles head lights
- iii) Used as shaving mirrors
- iv) The dentists used to test / examine teeth of patients
- v) Used in solar furnace.

- b) An object is placed at a distance of 15 cm on the principal axis in front of a concave lens with a focal length of 10 cm. Find the image distance. (JULY 2022)

$$\text{b) Given } f = -10 \text{ cm}, u = -15 \text{ cm} \quad \frac{1}{v} = \frac{-5}{30}$$

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$\frac{-1}{10} = \frac{1}{v} + \frac{1}{15}$$

$$\frac{1}{v} = -\frac{1}{10} - \frac{1}{15}$$

$$\frac{1}{v} = \frac{-3-2}{30}$$

$$\frac{1}{v} = \frac{-1}{6}$$

$$v = -6 \text{ cm.}$$

Image distance = -6 cm.

6. a) State Joule's law of heating. Name any two devices that work on the application of this law. (JULY 2022)

The heat produced in a resistor is

- i) directly proportional to the square of current for a given resistance
- ii) directly proportional to the resistance for a given current
- iii) directly proportional to the time for which the current flows through the resistor.

$$H = I^2 R t$$

The devices that work on this law are

- Electric Toaster
- Electric Oven
- Electric Kettle
- Electric Bulb
- Electric Fuse

- b) Why are the alloys like nichrome used in electrical heating devices? (JULY 2022)

Resistivity of alloys are more than /higher than that of metals.

Alloys do not oxidise (burn) readily at high temperature.

Alloys have high melting point.

7. a) State Ohm's law. In domestic electric circuit electrical appliances are not connected in series. Why? (JULY 2022)

The potential difference (V) across the ends of a given metallic wire in an electric circuit is directly proportional to the current (I) flowing through it, provided its temperature remains the same.

$$V = IR$$

- In a series circuit the current is constant throughout the electric circuit due to this all electrical appliances not possible to work at the same value.
- In a series connection, when one component fails, the circuit is broken.

- b) Write the factors on which resistance of a conductor depends. (JULY 2022)

Factors on which resistance of a conductor depends:

- i) Length of a conductor
- ii) Area of cross-section of a conductor
- iii) Nature of the material
- iv) Temperature.

FIVE MARKS QUESTION

1. Explain the experiment conducted by Newton to show that white light contains seven colours. Sun appears red in colour during sunrise but appears white at noon. Explain with the reasons. (APRIL 2020)
2. a) What is refraction of light ? State two laws of refraction of light.
 - Light travelling obliquely from one medium to another, the direction of propagation of light in the second medium changes.
 - The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence all lie in the same plane.
 - The ratio of sine of angle of incidence to the sine of angle of refraction is constant, for the light of given colour and for the given pair of media /
 $\sin i / \sin r = \text{constant}$b) What is refractive index of light? "The refractive index of diamond is 2.42." What is the meaning of this statement? (APRIL 2022)
 - The ratio of speed of light in air and the speed of light in medium.
 - The ratio of speed of light in air and the speed of light in diamond is 2.42.
3. a) How does rainbow form in the nature? Explain. Mention the colour of the light that bends the most and that bends the least. (APRIL 2023)
 - It is caused by dispersion of sunlight by tiny water droplets present in the atmosphere.
 - The water droplets in the atmosphere act like small prisms.
 - They refract and disperse the incident sunlight, then reflect it internally and finally refract it again.
 - Due to the dispersion of light and internal reflection different colours reach observer's eye.
 - Violet colour bends the most.
 - Red colour bends the least.b) How does the eye lens accommodate to see the distant objects and nearby objects? Explain. (APRIL 2023)
 - When ciliary muscles relax, the curvature of the lens decreases and becomes thin. Then focal length of the lens increases and distant objects are clearly visible.
 - When ciliary muscles contract, the curvature of the lens increases and becomes thick. Then focal length of the lens decreases and nearby objects are clearly visible.
4. a) How does the lens of human eye accommodate to see the nearby objects and the distant objects? Explain. (JULY 2023)
 - When the ciliary muscles are relaxed the eye lens becomes thin
 - This increases its focal length
 - and the distant objects can be seen clearly
 - When the ciliary muscles contract the eye lens becomes thick This decreases its focal length
 - and the nearby objects can be seen clearly.b) Explain the formation of rainbow in the nature. (JULY 2023)
 - The water droplets act like small prisms
 - They refract and disperse the incident sunlight
 - Then reflect internally
 - Finally refract again while coming out of water droplets. Due to the dispersion of light in this manner the rainbow is formed.

CHEMISTRY QUESTION BANK

SSLC BOARD PAPERS

MULTIPLE CHOICE QUESTIONS

1. As the pH value of a neutral solution increases (APRIL 2020)

- (A) basic property decreases and number of OH^- ions increases
- (B) acidic property increases and number of H^+ ions decreases
- (C) basic property increases and number of OH^- ions increases
- (D) acidic property decreases and number of H^+ ions increases.

Ans: (C) basic property increases and number of OH^- ions increases

2. An example for saturated hydrocarbon is (APRIL 2020)

- (A) C_2H_6
- (B) C_3H_4
- (C) C_2H_2
- (D) C_2H_4

Ans: (A) C_2H_6

3. The molecular formula of three carbon compounds which are in homologous series are C_2H_6 , C_3H_8 , C_4H_{10} . The suitable general formula for these compounds is (APRIL 2020)

- (A) C_nH_{2n}
- (B) $\text{C}_n\text{H}_{2n-1}$
- (C) $\text{C}_n\text{H}_{2n-2}$
- (D) $\text{C}_n\text{H}_{2n+2}$

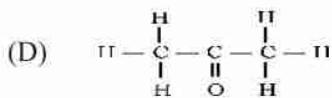
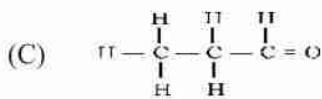
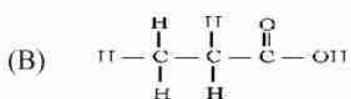
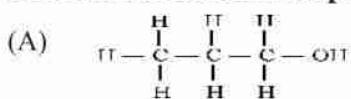
Ans: (D) $\text{C}_n\text{H}_{2n+2}$.

4. A compound that reacts with both acids as well as bases to produce salts and water is (JULY 2021)

- (A) aluminium oxide
- (B) copper oxide
- (C) iron oxide
- (D) sodium oxide

Ans: (A) aluminium oxide

5. Structural formula of propanal is (JULY 2021)



Ans. (C) A structural formula showing a three-carbon chain. The first carbon is bonded to three hydrogen atoms. The second carbon is bonded to two hydrogen atoms and is single-bonded to an oxygen atom. The third carbon is not explicitly shown but is implied to be part of the chain.

6. Observe the following chemical reactions (JULY 2021)



The decreasing order of reactivity of the metals in the above reactions is

- (A) Zn > Fe > Cu (B) Fe > Cu > Zn
(C) Zn > Cu > Fe (D) Cu > Fe > Zn

Ans: (A) Zn > Fe > Cu

7. The number of single bonds and double bonds present in a structure of benzene molecule respectively (JULY 2021)

- (A) 3 and 9 (B) 9 and 3
(C) 6 and 6 (D) 7 and 5

Ans: (B) 9 and 3

8. The gas liberated when sodium carbonate reacts with dilute hydrochloric acid is (JULY 2021)

- (A) carbon dioxide (B) nitrogen dioxide
(C) hydrogen (D) chlorine

Ans.: (A) carbon dioxide

9. The substance that converts blue litmus paper into red colour is (JULY 2021)

- (A) lime water (B) pure water
(C) sodium hydroxide solution (D) gastric juice

Ans. (D) gastric juice

10. The process used to convert sulphide ores of metals into their oxides is (JULY 2021)

- (A) calcination (B) roasting
(C) reduction (D) electrolysis

Ans: (B) roasting

11. The common molecular formula of both hexene and cyclohexane is (JULY 2021)

- (A) C₆H₆ (B) C₆H₁₄
(C) C₆H₁₂ (D) C₆H₁₀

Ans: (C) C₆H₁₂

12. An acid present in the stinging hair of nettle plant leaves is (JULY 2021)

- (A) methanoic acid (B) oxalic acid
(C) citric acid (D) lactic acid

Ans: (A) methanoic acid

13. The metal oxide that exhibits both acidic and basic properties is (SEP 2021)

- (A) aluminium oxide (B) sodium oxide
(C) potassium oxide (D) magnesium oxide

Ans: (A) aluminium oxide

14. The stages followed during the extraction of zinc from zinc sulphide ore are respectively (SEP 2021)

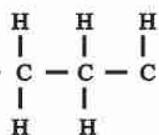
- (A) Calcination, Reduction, Refining (B) Roasting, Calcination, Refining
(C) Roasting, Reduction, Refining (D) Calcination, Oxidation, Refining

Ans: (C) Roasting, Reduction, Refining

15. The pair of carbon compounds having same molecular formula is (SEP 2021)

- (A) Hexane, Hexene (B) Hexene, Hexyne
(C) Hexene, Benzene (D) Hexene, Cyclohexane

Ans: (D) Hexene, Cyclohexane



16. The functional group present in this carbon compound is (SEP 2021)

- (A) Aldehyde (B) Ketone
(C) Carboxylic acid (D) Alcohol

Ans. : (A) Aldehyde

17. Observe the following equations of chemical reactions: (SEP 2021)



The increasing order of reactivity of the metals in the above reactions is

- (A) Fe < Zn < Al (B) Al < Zn < Fe
(C) Zn < Fe < Al (D) Al < Fe < Zn

Ans: (A) Fe < Zn < Al

18. A group of carbon compounds that are in homologous series (SEP 2021)

- (A) CH₄, C₂H₄, C₃H₄ (B) C₂H₂, C₂H₆, C₃H₆
(C) C₂H₄, C₃H₆, C₄H₈ (D) C₃H₆, C₃H₈, C₃H₄

Ans: (C) C₂H₄, C₃H₆, C₄H₈

19. The saturated hydrocarbon among the following is (SEP 2021)

- (A) C₅H₈ (B) C₂H₂
(C) C₆H₆ (D) C₅H₁₂

Ans: (D) C₅H₁₂

20. Observe the following table (SEP 2021)

Material	pH value
P	7.4
Q	2.2
R	10
S	1.2

The material that has very less hydrogen ions (H⁺) among these is

- (A) R (B) S
(C) Q (D) P

Ans. : (A) R

21. The gas liberated when sodium bicarbonate reacts with dilute hydrochloric acid is (SEP 2021)

- (A) hydrogen (B) nitrogen
(C) carbon dioxide (D) nitrogen dioxide

Ans.: (C) carbon dioxide

22. The substance that changes red litmus paper into blue colour is (SEP 2021)

- (A) sodium hydroxide solution (B) citric acid solution
(C) sodium chloride solution (D) pure water

Ans.: (A) sodium hydroxide solution

23. Identify the correct electron dot structure of nitrogen molecule in the following. (SEP 2021)

- Ans: A) :N::N: B) : $\ddot{\text{N}}$.. $\ddot{\text{N}}$:
C) · $\ddot{\text{N}}$:: $\ddot{\text{N}}$: D) ·N::N·
A) :N::N:

24. The name and the molecular formula of the unsaturated hydrocarbon having general formula $C_n H_{2n}$ and containing 3 carbon atoms is (APRIL 2022)

- (A) Propane, C₃H₈ (B) Cyclopropane, C₃H₆
(C) Propyne, C₃H₄ (D) Propene, C₃H₆

Ans.: (D) Propene, C₃H₆

25. The gas liberated at the cathode in the electrolysis of water is (APRIL 2022).

- (A) Oxygen (B) Hydrogen
(C) Chlorine (D) Nitrogen.

Ans.: (B) Hydrogen

26. The reactants that exchange ions by reacting with each other and form a precipitate among the following are (APRIL 2023)

- (A) BaCl₂ and Na₂SO₄ (B) Al₂O₃ and HCl
(C) NaOH and H₂SO₄ (D) Na₂O and CO₂

Ans: (A) BaCl₂ and Na₂SO₄

27. Chips manufacturers, flush bags of chips with nitrogen gas because, to (JULY 2023)

- (A) prevent corrosion of chips (B) prevent chips from getting oxidised
(C) make chips undergo rancidity (D) prevent the chips from getting reduced.

Ans: (B) prevent chips from getting oxidised.

28. The metal that displaces copper from copper sulphate solution is (JULY 2022)

- (A) mercury (B) gold
(C) iron (D) silver

Ans: (C) iron

29. Number of single bonds found in the molecular structure of propanal is (JULY 2022)

- (A) 8 (B) 6
(C) 7 (D) 5

Ans.: (A) 8

ONE MARKS QUESTIONS

1. An iron ring is to be coated with copper. How can we do this without using electricity? (APRIL 2020)

Ans: Iron ring should be dipped in copper sulphate solution. Iron displaces copper from copper sulphate solution and copper is coated on ironring.

2. $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$, In this reaction name the reactant (APRIL 2020)

- i) that is oxidised ii) that is reduced.

Ans: i) Hydrogen or H_2 ii) Copper Oxide or CuO .

3. What are amphoteric oxides? (SEP 2020)

Ans: Metallic oxides that show both acidic and basic behaviour are called amphoteric oxides.

4. Can detergent be used to test hardness of water? Give reason. (SEP 2020)

Ans: No Detergents give foam / lather with both hard water and soft water and do not form scum.

5. Manufacturers of chips, flush the packets of chips with nitrogen gas Why? (SEP 2020)

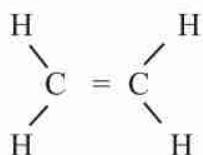
Ans: To prevent the chips from getting oxidised. OR To prevent rancidity.

6. Write any two uses of Plaster of Paris. (APRIL 2022)

Ans: Plaster of Paris is used in :

- Supporting fractured bones
- Making toys
- Decorative materials
- Making smooth surfaces.

7. Write the structural formula of ethene molecule. (APRIL 2022)



8. $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$ In this reaction name the reactant (APRIL 2022)

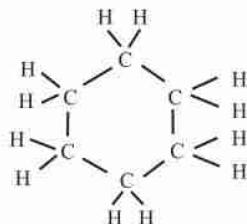
- i) that is oxidised and ii) that is reduced.

Ans: Oxidised reactant is: C

Reduced reactant is: ZnO

9. The general formula of cycloalkanes is C_nH_{2n} and its first member is cyclopropane (C_3H_6). Write the molecular formula and structural arrangement of the fourth member of this homologous series. (APRIL 2023)

Ans: Molecular formula: C_6H_{12}



10. Packets of chips are flushed with nitrogen gas. Why? (APRIL 2023)

Ans: To prevent chips from getting oxidised / to prevent rancidity.

11. An iron nail is dropped into a test tube having copper sulphate solution. The iron nail gradually turns to brownish colour. Why? (APRIL 2023)

Ans: Since iron is more reactive than copper, it displaces copper from copper sulphate solution / Displaced copper gets deposited on the iron nail.

12. What is hydrogenation? (APRIL 2023)

Ans: Hydrogen is added to unsaturated hydrocarbons in the presence of catalyst such as palladium or nickel to give saturated hydrocarbons. This is known as hydrogenation.

OR

Conversion of unsaturated oils into saturated fats by adding hydrogen in the presence of palladium / nickel like catalyst.

13. Name the product produced when calcium oxide reacts with water. (JULY 2023)3

Ans: Calcium hydroxide / slaked lime OR Ca(OH)_2

14. Name the ions responsible for acidic and basic natures of the substances. (JULY 2023)

Ans: Acidic — H^+ / H_3O^+ / Hydrogen / Hydronium

Basic — OH^- / Hydroxyl / Hydroxide

15. Why are detergents more suitable for cleansing clothes in hard water? (JULY 2023)

Ans: Detergents do not form insoluble precipitates with calcium / magnesium ions present in hard water.

16. Ionic compounds have high melting point and boiling point. Why? (JULY 2023)

Ans: Considerable amount / more amount of energy is required to break the strong inter ionic attraction between the molecules.

TWO MARKS QUESTIONS

1. Agricultural scientists have suggested to add a certain amount of lime powder to an agricultural field. What may be the reasons for this? Explain (APRIL 2020)

Ans: ♦ Plants require a specific pH range for their healthy growth.
♦ Soil of his land is acidic.
♦ Lime powder is a base.
♦ So adding lime powder to the soil, decreases the acidic property / soil is neutralised.

2. Which physical properties are used in the following situations? (APRIL 2020)

- i) Gold is used to make ornaments
- ii) Nickel is used in strings of guitar.

Ans: i) Shining surface / Metallic lustre
Ductility
Malleability

ii) Sonorous
Ductility

3. The pH values of A, B and C solutions are 5, 6 and 7 respectively. Which of these solutions is more acidic in nature? Why? (APRIL 2022)

Ans: Solution A is more acidic.
As it has more + H ions.

4. Give reason: (APRIL 2022)

a) **Metals are used in making cooking vessels.**

Ans: Because, metals are good conductors of heat / having high melting points / property of malleability.

b) **Sodium metal is stored in kerosene.**

Ans: Sodium metal vigorously reacts with atmospheric oxygen and water, but not with kerosene.

5. Give reason: (APRIL 2022)

a) **When a calcium metal reacts with water, the liberated hydrogen gas does not catch fire.**

Ans: The reaction of calcium with water is less violent. The heat evolved is not sufficient for the hydrogen to catch fire.

b) **Ionic compounds have high melting and boiling points.**

Ans: Because a considerable amount of energy is required to break the strong inter-ionic attraction.

6. “Calcium oxide and carbon dioxide are produced on heating calcium carbonate.” Write the balanced chemical equation for this reaction. Mention the type of this chemical reaction. (APRIL 2023)

Ans. : $\text{CaO} + \text{CO}_2 \longrightarrow \text{CaCO}_3$
(Thermal) decomposition reaction/endothermic reaction

7. In a homologous series, the first member of hydrocarbon group has the molecular formula CH_4 . Then find out the molecular formula of the fourth member and write two types of structural formula of it.

Ans.:

* C_1H_4

$$\frac{\text{C}_1\text{H}_2}{\text{C}_2\text{H}_6}$$

OR $\text{C}_n\text{H}_{2n+2}$

$\text{C}_4\text{H}_{(2 \times 4)+2}$

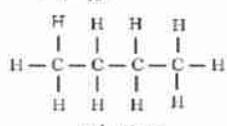
* $\frac{\text{C}_1\text{H}_2}{\text{C}_3\text{H}_8}$

* $\frac{\text{C}_1\text{H}_2}{\text{C}_4\text{H}_{10}}$

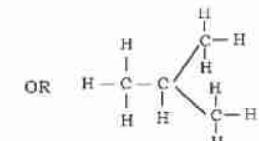
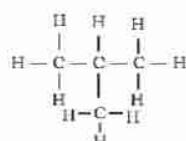
$\text{C}_4\text{H}_{(8+2)}$

C_4H_{10}

Butane (C_4H_{10}) structures



n-butane



8. What are alloys? Write the constituent elements present in bronze and solder metal. (JULY 2023)

Ans:

- An alloy is a homogenous mixture of two or more metals or metals and non-metals.
- Bronze—Copper and tin / Cu and Sn
- Solder metal—Lead and tin / Pb and Sn

11. What are ores? Name the respective methods used to convert sulphide and carbonate ores of metals into their oxides. (JULY 2023)

- Minerals contain a very high percentage of a particular metal and the metal can be profitably extracted from it.
- Metallic sulphide ore—Roasting
- Metallic carbonate ore—Calcination

9. Add same amount of barium chloride solution to a test tube containing 5 ml of sodium sulphate solution. Then (JULY 2023)

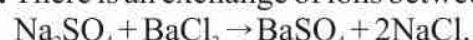
- Which insoluble white precipitate is formed?
- Name the ions responsible for the formation of white precipitate.
- Mention the type of chemical reaction that took place here.

Ans:

- BaSO_4 /barium sulphate
- SO_4^{2-} sulphate radical & Ba^{2+} Barium ion
- Double displacement reaction / precipitation reaction.

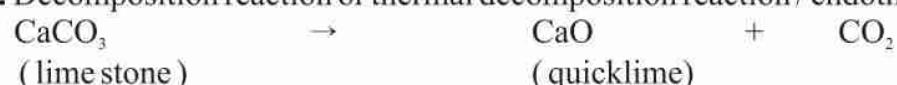
10. The chemical reaction that takes place between sodium sulphate and barium chloride is called double displacement reaction. Why? Write the balanced chemical equation for this reaction. (JULY 2022)

Ans: There is an exchange of ions between the reactant's sodium sulphate and barium chloride.



11. What is the type of chemical reaction in which quicklime is obtained by lime stone (calcium carbonate)? Write a chemical equation for this reaction. (JULY 2022)

Ans: Decomposition reaction or thermal decomposition reaction / endothermic reaction.



THREE MARKS QUESTIONS

1. The reaction of Barium chloride with Aluminium sulphate solution is an example for which type of chemical reaction? Why? Write the balanced chemical equation for this reaction. (APRIL 2020)

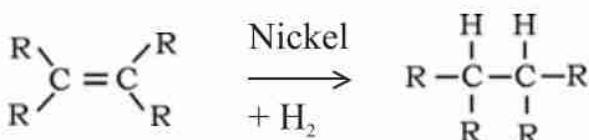
Ans:

- It is an example for double displacement reaction.
- Precipitation reaction.
- There is an exchange of ions between the reactants.
- White precipitate of Barium Sulphate is formed.
- $3\text{BaCl}_2 + \text{Al}_2(\text{SO}_4)_3 \rightarrow 3\text{BaSO}_4 + 2\text{AlCl}_3$

2. Explain the addition and substitution reaction with the help of examples. C_2H_6 undergoes substitution reaction but not addition reaction. Why? (SEP 2020)

Ans: Unsaturated hydrocarbons combine with hydrogen atoms in the presence of catalysts to give saturated hydrocarbons.

Example : Hydrogenation of vegetable oil. Or addition reactions of alkenes / alkynes.



In the presence of sunlight other group of atoms can replace hydrogen atoms one by one from carbon compounds.

Example: In the presence of sunlight

Chlorine replaces hydrogen atoms one by one from methane.

Methane + Chlorine \rightarrow Chloromethane + Hydrogen chloride

C_2H_6 is saturated hydrocarbon. OR

In C_2H_6 there will be single bond between carbon atoms / This is not an unsaturated compound. No hydrogen atoms can be added but hydrogen atoms can be substituted.

3. Explain how soap cleans clothes. More amount of soap is required to clean the clothes in hard water. Why? (APRIL 2020)

Ans:

- The molecules of soap are sodium or potassium salts of long chain carboxylic acids.
- The ionic end of soap interacts with water while the carbon chain interacts with oil.
- The soap molecules thus form structure called micells. This forms an emulsion in water.
- The soap micelles thus helps in pulling out the dirt in water and we can wash our clothes clean.
- The reaction of soap with calcium and magnesium salts in hard water develop scum (precipitation, insoluble substance). Hence, we need large amount of soap to clean clothes in hard water.

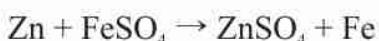
- 4.** Strips of zinc, iron, magnesium and copper are taken in the test tubes *A*, *B*, *C* and *D* respectively. Same quantity of ferrous sulphate solution is added to these test tubes. In which test tube's chemical reaction will occur? Why? Write the chemical equations for the reactions taking place here. (SEP 2020)

Ans: ➤ Chemical reaction occurs in test tubes *A* and *C*.
➤ Because zinc and magnesium are more reactive than iron.

OR

➤ Zinc and magnesium are found above iron in the reactivity series of metals.
➤ Zinc + Ferrous sulphate → Zinc sulphate + Iron

OR



➤ Magnesium + Ferrous sulphate → Magnesium sulphate + Iron
OR



- 5.** Write the balanced chemical equations for the following chemical reactions. How can we confirm by observation that these chemical reactions are taking place?

- a) Lead nitrate is heated. (SEP 2020)
b) Sodium sulphate reacts with Barium chloride. (SEP 2020)

Ans: a) $2\text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$
By the formation of brown coloured fumes.

b) $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$
By the formation of white coloured precipitate.

- 6.** Write the molecular formulae and two uses of each of the following compounds

- a) Bleaching powder (SEP 2020)
b) Plaster of Paris. (SEP 2020)

Ans:

a) CaOCl_2

Uses :

- for bleaching cotton and linen in the textile industry, for bleaching wood pulp in paper factories and for bleaching washed clothes in laundry.
➤ as an oxidising agent in many chemical industries
➤ to make drinking water free from germs.

b) $\text{CaSO}_4 \cdot \text{H}_2\text{O}$

Uses :

- for making toys
➤ making materials for decoration
➤ for making surfaces smooth.

7. What is a strong acid? Explain how tooth decay is caused. How can it be prevented? (SEP 2020)

Ans: Acid that gives rise to more H^+ ions is said to be strong acid.

Bacteria present in the mouth produce acids by degradation of sugar and food particles remaining in the mouth after eating. So the pH in the mouth decreases and the tooth enamel gets corroded.

Using toothpastes which are generally basic, for cleaning the teeth.

8. Write the balanced chemical equation for the following chemical reactions: (APRIL 2022)

- Calcium carbonate \rightarrow Calcium oxide + Carbon dioxide
- Hydrogen + Chlorine \rightarrow Hydrogen chloride
- Magnesium + Hydrochloric acid \rightarrow Magnesium chloride + Hydrogen.

Ans:

- $CaCO_3 \rightarrow CaO + CO_2$
- $H_2 + Cl_2 \rightarrow 2HCl$
- $Mg + 2HCl \rightarrow MgCl_2 + H_2$

9. Which type of chemical reaction takes place when an iron nail is dipped in copper sulphate solution? Why? Write a balanced chemical equation for this chemical reaction. (APRIL 2022)

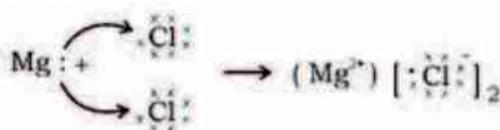
Ans: Chemical displacement reaction.

Because more reactive iron displaces copper from copper sulphate solution.



10. a) Depict the formation of magnesium chloride with the help of electron dot structure. (APRIL 2023)

Ans: a) $Mg \rightarrow Mg^{2+} + 2e^-$



b) Hydrogen gas is not liberated when a metal like zinc reacts with nitric acid. Why? (APRIL 2023)

- Nitric acid is a strong oxidising agent
- It oxidises the hydrogen produced to water and itself gets reduced to oxides of nitrogen.

11. How are metals in the middle of the reactivity series extracted from their ores ? Explain. (APRIL 2023)

Ans:

- Metals in the middle of the activity series are in the form of sulphide or carbonate ores.
- The sulphide ores are converted into oxides by roasting. Roasting is heating the ores strongly in the presence of excess air.
- The carbonate ores are converted into oxides by heating strongly in limited air in calcination.
- The metal oxides are then reduced to the corresponding metals by using reducing agents such as carbon.

12. Name the salts used in the following situations and write their molecular formula: (APRIL 2023)

- To remove permanent hardness of water.
- To make drinking water free from germs.
- To support fractured bones in their right position.

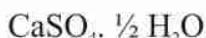
Ans: a) Washing soda / sodium carbonate



b) Bleaching powder / Calcium oxychloride



c) Plaster of Paris / Calcium sulphate hemihydrate



13. a) The pH values of four solutions are given in the below table. Classify these into acidic and basic solutions: (APRIL 2023)

Solution	pH value
e	5
f	13
g	9
h	2

Ans

Acidic Solutions	Basic Solutions
e	f
h	g

b) Name the antacid used to neutralise excess of acid in the stomach. (APRIL 2023)

Ans: Milk of magnesia/Magnesium hydroxide / $\text{Mg}(\text{OH})_2$

OR

Sodium hydrogen carbonate / NaHCO_3

14. a) Identify unsaturated hydrocarbons in the following carbon compounds and write their structural formula. C_6H_6 , C_5H_{12} , $\text{C}_2\text{H}_5\text{OH}$, C_2H_2 . (JULY 2023)

Unsaturated hydrocarbons	Structural formula
C_6H_6	
C_2H_2	$\text{H}-\text{C}\equiv\text{C}-\text{H}$

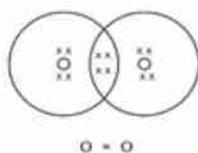
b) Write the difference between esterification and saponification. (JULY 2023)

Esterification : Reaction between an acid and an alcohol to produce esters.

Saponification : Reaction between an alkaline base and long chain carboxylic acid to produce soaps [or sodium / potassium salts of long chain carboxylic acid]

15. a) Write electron dot structure of oxygen molecule. (JULY 2023)

Ans:



16. a) What is neutralisation reaction? Give an example. (JULY 2022)

b) What is the common name of the compound that has molecular formula $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$.

Ans: a) Reaction between acids and bases to form salt and water is called neutralisation reaction.

OR

Base + Acid \rightarrow Salt + water.

Ex : $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$.

b) Calcium sulphate hemihydrate or Plaster of Paris.

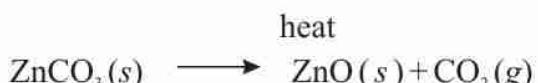
FOUR MARKS QUESTIONS:

1. Mention the difference between calcination and roasting. How these processes are used in the extraction of zinc? Explain with the help of chemical equations. After these processes is reduction necessary to obtain zinc? Why? (APRIL 2020)

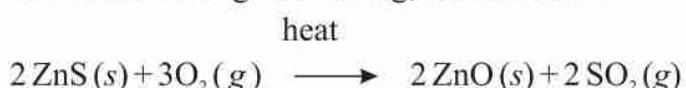
Ans:

- Carbonate ores are converted into oxides by heating strongly in *limited* air. This process is known as calcination.
- Sulphide ores are converted into oxides by heating strongly in the presence of excess of air. This process is known as roasting.

When ZnCO_3 undergoes calcination ZnO is formed.



When ZnS undergoes roasting, ZnO is formed.

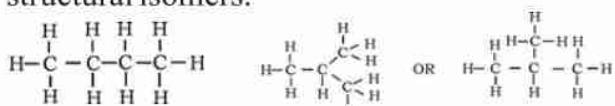


After these processes reduction is necessary.

Because zinc oxide is then reduced to zinc using suitable reducing agent.

2. a) What are structural isomers? Write two structures of butane molecule.
b) How would you distinguish experimentally between an alcohol and a carboxylic acid? (SEP 2020)

Ans: a) Carbon compounds with identical molecular formula but different structures are called structural isomers.



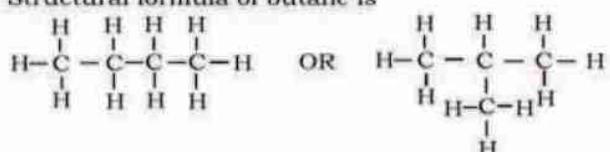
- b) Carboxylic acid reacts with carbonates and hydrogen carbonates to give rise to a salt, carbon dioxide and water.

Alcohol will not react with carbonates and hydrogen carbonates

3. a) What are structural isomers? Write the molecular and structural formula of butane. (APRIL 2022)

Ans: Carbon compounds having same molecular formula but different structural formulae. Molecular formula of butane is C_4H_{10}

Structural formula of butane is



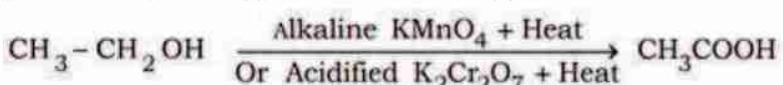
- b) What is catenation? Write general formula for alkenes. (APRIL 2022)

Ans: Carbon has unique ability to form bonds with other atoms of carbon, giving rise to large molecules.

General formula for alkene is C_nH_{2n}

4. a) How will ethanol be oxidised? (APRIL 2023)

Ans: Ethanol is oxidised into ethanoic acid by heating with oxidising agents like alkaline potassium permanganate or acidified potassium dichromate.



b) Explain the cleaning action of soaps. (APRIL 2023)

Ans: ➤ Soaps are sodium or potassium salts of long-chain carboxylic acids.
➤ Soap molecules form micelles, in which the ionic end interacts with water and faces outside.
➤ Carbon chain of the soap interacts with oil or dirt.
➤ This forms emulsion in water. The soap molecules pull out the dirt and wash the clothes clean.

5. a) Explain the manufacturing of bleaching powder. Write any two uses of it. (JULY 2023)

Ans: Bleaching powder is produced by the action of chlorine on dry slaked lime.

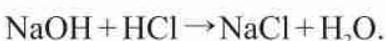


Uses:

- For bleaching cotton and linen in the textile industry, wood pulp in paper factories.
- For bleaching washed clothes in laundry
- As an oxidising agent in chemical industry
- to make drinking water free from germs.

b) A strong solution of sodium hydroxide is added to the strong solution of hydrochloric acid. What is the nature of the salt solution formed here? Write a balanced chemical equation for this reaction. (JULY 2023)

Ans: The salt solution is a neutral solution.

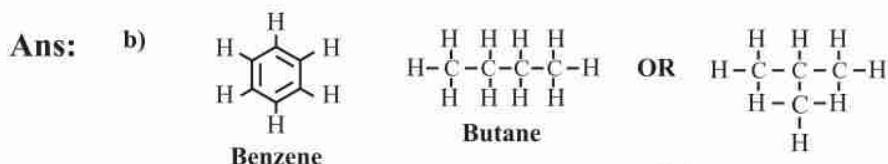


6. a) Write any two differences between saturated and unsaturated carbon compounds. (JULY 2022)

	Saturated carbon compounds	Unsaturated carbon compounds
Ans:	i) Single bond exists between two consecutive carbon atoms ii) Less reactive iii) Give clean flame when they burnt iv) Subjected to substitution reaction v) Ex. : Alkanes, cycloalkanes etc.	i) Double and triple bond exists ii) More reactive iii) Give yellow / black flame iv) Subjected to both addition and substitution reactions v) Ex. : Alkenes, alkynes, benzene etc

b) Write the structural formula of the following carbon compounds : (JULY 2022)

- i) Benzene ii) Butane



FIVE MARKS QUESTIONS :

1. a) Explain the formation of ionic bond between sodium atom and chlorine atom. [Atomic number of sodium is 11, Atomic number of chlorine is 17] (JULY 2022)

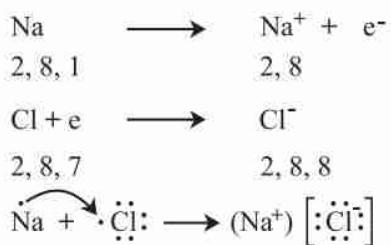
Ans: Electronic configuration of sodium atom is 2, 8, 1

Electronic configuration of chlorine atom is 2, 8, 7

To have stable octet configuration sodium loses its one valence electron, thus forms sodium cation (Na^+) and chlorine receives one electron to its valence shell, thus forms chloride anion (Cl^-).

Due to the electrostatic force between oppositely charged Na^+ and Cl^- ions sodium chloride (NaCl) forms.

OR



- b) List any four general properties of ionic compounds. (JULY 2022)

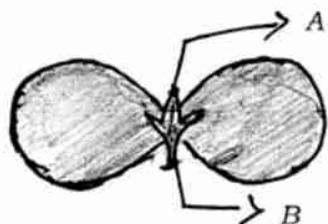
Ans: Properties of ionic compounds :

- i) Generally, solids
- ii) Generally brittle and breaks into pieces when pressure is applied.
- iii) They have high melting and boiling points.
- iv) Soluble in water and not soluble in organic solvents.
- v) They do not conduct electricity in solid state / good conductors in molten or aqueous state.

BIOLOGY QUESTION BANK **SSLC BOARD PAPERS**

MULTIPLE CHOICE QUESTIONS

- 1.** In the given figure of Cotyledon, the parts labelled as *A* and *B* respectively are (APRIL 2020)



- (A) fruit, shoot (B) primary shoot, primary root
(C) secondary root, primary shoot (D) bud, leaf.

Ans. : (B) primary shoot, primary root

- 2.** The incorrect statement related to thyroxine hormone among the following is (APRIL 2020)

- (A) it regulates fat metabolism
(B) its deficiency leads to goitre
(C) it is secreted by parathyroid gland
(D) iodine in the food is essential for its production.

Ans. : (C) it is secreted by parathyroid gland

- 3.** The hormone that regulates carbohydrate, protein and fat metabolism in the human body is (JULY 2021)

- (A) Testosterone (B) Adrenaline
(C) Insulin (D) Thyroxin

Ans. : (D) Thyroxin

- 4.** A pot that has growing seedling is kept in a dark room. A burning candle is placed near it for a few days. The top part of the seedling bends towards the light of burning candle. This is (JULY 2021)

- (A) Chemotropism (B) Phototropism
(C) Geotropism (D) Hydrotropism

Ans. : (B) Phototropism

- 5.** The correct statement with respect to biodegradable substances among the following. These substances (JULY 2021)

- (A) undergo recycling naturally in the environment
(B) harm various organisms in the ecosystem
(C) increase the density of harmful chemicals in different tropic levels
(D) remain inert in the environment for a long time

Ans. : (A) undergo recycling naturally in the environment

- 6. The correct sequence found in the process of sexual reproduction in a flower is (JULY 2021)**
- (A) pollination, fertilization, seed, embryo (B) seed, embryo, fertilization, pollination
(C) embryo, seed, pollination, fertilization (D) pollination, fertilization, embryo, seed
- Ans : (D) pollination, fertilization, embryo, seed**
- 7. If a round green seeded pea plant [RRyy] is crossed with wrinkled yellow seeded pea plant [rrYY], the seeds produced in F₁ generation are (JULY 2021)**
- (A) round and green seeds (B) wrinkled and yellow seeds
(C) round and yellow seeds (D) wrinkled and green seeds
- Ans. : (C) round and yellow**
- 8. The blood vessels that carry blood from all parts of the human body to the heart are (JULY 2021)**
- (A) arteries (B) capillaries
(C) pulmonary arteries (D) veins
- Ans. : (D) veins**
- 9. Plants can get rid of excess of water by this process (JULY 2021)**
- (A) Transpiration (B) Photosynthesis
(C) Respiration (D) Translocation
- Ans. : (A) Transpiration**
- 10. The gap between two neurons is (JULY 2021)**
- (A) dendrite (B) axon
(C) synapse (D) cell body
- Ans. : (C)synapse**
- 11. The embryo gets nutrition from the mother's blood with the help of a special part called (JULY 2021)**
- (A) Fallopian tube (B) Ovary
(C) Uterus (D) Placenta
- Ans : (D) Placenta**
- 12. The common passage for both sperms and urine in human male reproductive system is (JULY 2021)**
- (A) Urethra (B) Ureter
(C) Vas deferens (D) Urinary bladder
- Ans: (A) Urethra**
- 13. A plant hormone that inhibits the growth of plants is (SEP 2021)**
- (A) Auxin (B) Gibberellin
(C) Cytokinin (D) Abscisic acid
- Ans : (D) Abscisic acid**
- 14. The centre of reflex action is (SEP 2021)**
- (A) Cerebrum (B) Spinal cord
(C) Cerebellum (D) Hypothalamus
- Ans: (B) Spinal cord**

15. The correct path of movement of electrical impulse in a neuron is (SEP 2021)

- (A) Dendrite → Cell body → Axon → Axon end
- (B) Axon → Axon end → Dendrite → Cell body
- (C) Dendrite → Axon → Cell body → Axon end
- (D) Cell body → Dendrite → Axon end → Axon

Ans: (A) Dendrite → Cell body → Axon → Axon end

16. The blood vessels that carry deoxygenated blood from the heart to the lungs in the human body are (SEP 2021)

- | | |
|---------------------|------------------------|
| (A) Pulmonary veins | (B) Aorta |
| (C) Veins | (D) Pulmonary arteries |

Ans: (D) Pulmonary arteries

17. Tall pea plants having round seeds ($TTRR$) are crossed with dwarf pea plants having wrinkled seeds ($ttrr$). The progeny obtained in F_1 generation is (SEP 2021)

- (A) Tall plants having wrinkled seeds
- (B) Tall plants having round seeds
- (C) Dwarf plants having round seeds
- (D) Dwarf plants having wrinkled seeds

Ans: (B) Tall plants having round seeds

18. The parts that develop into fruit and seed in a flower respectively are (SEP 2021)

- | | |
|----------------------|----------------------|
| (A) stamen and ovary | (B) ovule and ovary |
| (C) ovary and ovule | (D) stamen and ovule |

Ans: (C) ovary and ovule

19. In the human female reproductive system, the egg is carried from ovary to the uterus through this part (SEP 2021)

- | | |
|--------------|--------------------|
| (A) cervix | (B) fallopian tube |
| (C) placenta | (D) vagina |

Ans: (B) fallopian tube

20. The materials that change slowly their form and structure in the environment are (SEP 2021)

- | | |
|------------------|-------------------------|
| (A) Plant fibres | (B) Peels of vegetables |
| (C) Waste papers | (D) Used tea leaves |

Ans: (A) Plant fibres

21. The transport of soluble products of photosynthesis in plants is (SEP 2021)

- | | |
|-------------------|-------------------|
| (A) Transpiration | (B) Osmosis |
| (C) Diffusion | (D) Translocation |

Ans: (D) Translocation

22. A common bacterial infection that spreads through sexual contact in human beings is (SEP 2021)

- | | |
|-----------------|-----------|
| (A) Gonorrhoea | (B) AIDS |
| (C) Hepatitis-B | (D) Warts |

Ans: (A) Gonorrhoea

- 23. The genotypic ratio of F_2 generation of Mendel's monohybrid cross experiment is (SEP 2021)**
- (A) 3 : 1 (B) 2 : 1
(C) 1 : 2 : 1 (D) 9 : 3 : 3 : 1

Ans. : (C) 1 : 2 : 1

- 24. The type of reproduction found in Spirogyra is (SEP 2020)**
- (A) Budding (B) Fragmentation
(C) Vegetative reproduction (D) Spore formation

Ans : (B) Fragmentation

- 25. The site of complete digestion of carbohydrates, proteins and fats is (SEP 2020)**
- (A) stomach (B) large intestine (C) small intestine (D) liver.

Ans: (C) small intestine

- 26. Atmospheric layer that absorbs ultraviolet radiations coming from the sunlight is made up of this molecule. (APRIL 2022)**
- (A) N₂ (B) H₂ (C) O₃ (D) O₂

Ans: (C) O₃

- 27. In humans, sexually transmitted viral infection is (APRIL 2022)**
- (A) AIDS (B) Syphilis (C) Tuberculosis (D) Gonorrhoea

Ans : (A) AIDS

- 28. "A person immediately starts running soon after observing a snake." The correct transmission path of reflex impulse in this situation is (APRIL 2023)**
- (A) Receptor → Sensory neuron → Brain → Relay neuron → Motor neuron → Effector
(B) Receptor → Sensory neuron → Spinal cord → Relay neuron → Motor neuron → Effector
(C) Effector → Spinal cord → Sensory neuron → Relay neuron → Motor neuron → Receptor
(D) Effector → Motor neuron → Relay neuron → Brain → Sensory neuron → Receptor

Ans: (B) Receptor → Sensory neuron → Spinal cord → Relay neuron → Motor neuron → Effector

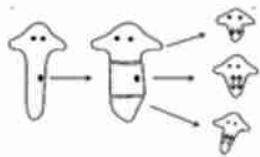
- 29. In humans, the testes are located outside the lower abdomen in the scrotum because (APRIL 2023)**
- (A) to protect testes from mechanical shocks
(B) to increase the production of sperms
(C) to maintain the secretion of testosterone hormone
(D) to maintain the temperature required for sperm production.

Ans: (D) to maintain the temperature required for sperm production.

- 30. Producers of aquatic eco-system are (JULY 2023)**
- (A) algae (B) small fishes (C) larvae (D) protozoa.

Ans: (A) algae

31. Biological process that has been shown in the diagram is (JULY 2023)



- (A) production of progenies by fragmentation method
- (B) production of progenies by multiple fission method
- (C) regeneration of tissues by development in specialised cells
- (D) asexual reproduction by vegetative propagation.

Ans: (C) regeneration of tissues by development in specialised cell

32. In plants the major function of xylem is the transportation of (JULY 2022)

- (A) water
- (B) food
- (C) amino acids
- (D) oxygen.

Ans: (A) water

33. An example for positive geotropism in plants is (JULY 2022)

- (A) growth of shoot
- (B) growth of roots into deep soil
- (C) growth of tendrils of creepers
- (D) upward growth of roots.

Ans: (B) growth of roots into deep soil

34. Primary consumers in any food chain are always (JULY 2022)

- (A) carnivores
- (B) herbivores
- (C) higher carnivores
- (D) producers.

Ans: (B) herbivores

35. Part of a flower in the plant that develops into fruit is (JULY 2022)

- (A) petal
- (B) stigma
- (C) ovary
- (D) style

Ans: (C) ovary

ONE MARKS QUESTIONS :

- 1. “The rate of breathing in aquatic organisms is much faster than that seen in terrestrial organisms.” Why? (APRIL 2020)**

Ans: Because, the amount of dissolved oxygen is fairly low compared to the amount of oxygen in the air.

- 2. The gene for brown coloured hair is recessive that of gene for black coloured hair. What is the hair colour of a person who has inherited a gene for brown coloured hair from mother and black coloured hair from father? (APRIL 2020)**

Ans: Black coloured hair

- 3. What is the role of decomposers in an ecosystem? (APRIL 2022)**

Ans: Decompose dead wastes (organic) of plants and animals thus keep surroundings clean and maintain ecological balance.

- 4. In males, testes are located outside the abdominal cavity in scrotum. Why? (APRIL 2022)**

Ans: Because to maintain lower temperature required for the formation of sperms than the normal body temperature.

- 5. What is the role of abscisic acid in plants? (APRIL 2023)**

Ans: Abscisic acid inhibits growth in plants.

- 6. Write two examples for the organisms that reproduce by binary fission. (APRIL 2023)**

Ans: Amoeba
Leishmania

- 7. What is biological magnification? (JULY 2023)**

Ans: The process of increasing the storage of harmful chemicals in the organisms that found in trophic levels of various food chains.

- 8. Which hormone inhibits the growth of plants? (JULY 2022)**

Ans: Abscisic acid

- 9. What is the sex of a child born by receiving X chromosome from father? (JULY 2022)**

Ans: Female child / baby girl

- 10. Nowadays Chlorofluorocarbon (CFC) free refrigerators are being manufactured. Why? (JULY 2022)**

Ans: CFC's are responsible for the decrease in the amount of ozone layer which protects the earth from ultraviolet rays of sun.

- 11. What is 'biological magnification'? (JULY 2022)**

Ans: Process that involves magnification (increase) of the harmful chemicals at different trophic levels of ecosystem.

TWO MARKS QUESTIONS

1. "The body temperature of frogs and lizards depend on temperature in the environment." Justify. (APRIL 2020)

Ans. : ➤ 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.

2. "As energy moves progressively through various trophic levels of food chain it is no longer available to the previous level." Give reasons. (SEP 2020)

Ans. : ➤ The flow of energy in the food chain is unidirectional.

➤ The energy that is captured by autotrophs does not revert back to the solar input.

➤ The energy which passes to the herbivores does not come back to autotrophs.

➤ The energy available at each trophic level gets diminished progressively due to loss of energy at each level.

3. Eating chapati by chewing it very slowly tastes sweeter. Why? (SEP 2020)

Ans. : ➤ While chewing chapathi saliva is secreted.

➤ Chapathi contains starch.

➤ The salivary amylase breaks down starch into simple sugars.

4. A person's 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. (SEP 2020)

Ans. : ➤ Adrenaline is directly secreted into the blood. The blood to the skin is reduced due to 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.

5. Mention the function of the following plant hormones: (APRIL 2022)

i) Auxin ii) Cytokinin.

Ans. : i) Auxin : Helps the cells in the stems and the cells in the many parts of the plant body to grow longer.

ii) Cytokinin :

• Promotes cell division in fruits and seeds

• Helps in promoting overall growth of plants.

6. Give reason: (APRIL 2022)

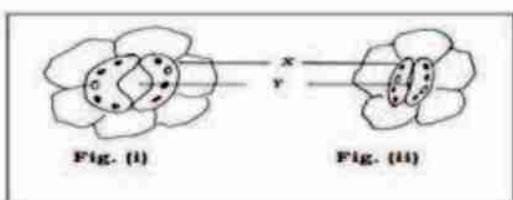
a) 'Ventricles of the human heart have thick wall.'

b) 'It is necessary to separate oxygenated and deoxygenated blood in mammals and birds.'

Ans. : a) Since ventricles have to pump blood into various organs.

b) Since they need more energy to maintain their body temperature constant.

7. Observe the given below figures: (APRIL 2023)



- Which figure indicates the massive amount of exchange of gases? Why?
- Name the parts X and Y. What is the function of other part X?

Ans: a) Fig. (i)/Open stomata

It is because the stomatal pore is open.

- b) X—Guard cell Y—Stomatal pore

Regulates opening and closing of stomatal pore.

8. Give an example for a food chain of grassland ecosystem. If there is an increase in the number of organisms in the second trophic level, how does this affect on that food chain? (APRIL 2023)

Ans : Grass → Grasshopper → Frog → Snake → Eagle

- If the number of organisms in the second trophic level increases, then the number of organisms in the first trophic level decreases.
- Eventually population of the rest of the organisms in the trophic levels decreases and leads to ecological imbalance.

9. Mention any two effects of non-biodegradable substances on the environment. (JULY 2022)

Ans:

- These substances do not undergo natural recycling and remain inert in the environment.
- May harm the various members by adding into different stages of ecosystem / cause 'Biological magnification'.
- Cause environmental pollution.

THREE MARKS QUESTIONS

- 1. Explain the structure and important role of placenta during gestation period of woman. (APRIL 2020)**

Ans : ➤ During pregnancy period the embryo gets nutrition from the mother's blood with help of disc shaped special tissue embeded 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.

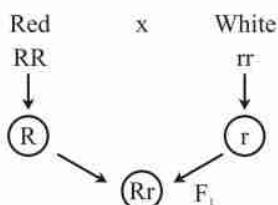
- 2. Explain the significant function of each structure in human male reproductive system. (APRIL 2020)**

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

- 3. Mendel crossed plants bearing red flowers (*RR*) with the plants bearing white flowers (*rr*) and produced progeny from them. The plants with red flowers obtained in F_1 generation were different from the plants with red flowers of parental generation. Why? Explain with reasons. (SEP 2020)**

Ans : ➤ In parent generation, plant bearing red flowers has both the dominant traits *RR*. In parent generation, plant bearing white flowers has both the recessive traits *rr*.
➤ F_1 generation plant inherits one copy of dominant trait (red) and one copy of recessive trait (white) from the parental plants *Rr*. But only the dominant trait (red) is expressed.

OR



- 4. How are the functions of arteries, veins and capillaries are interrelated in the circulation of blood? (SEP 2020)**

Ans : ➤ 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.

5. How does transportation of water take place over the heights in a plant? (SEP 2020)

- Ans :**
- 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 transpiration creates a suction which pulls water from xylem cells of root.

6. Give reason: (SEP 2020)

- a) Food chains generally consist of only three or four steps.
- b) Decomposers play an important role in an ecosystem.
- c) Protecting of ozone layer is necessary.

Ans : a) Very little energy is available (10%) for the next level of consumers.

OR

The loss of energy at each step is so great that very little usable energy remains after four trophic levels.

- b) Decomposers breakdown the dead remains and waste products of organisms / Decomposers breakdown the complex organic substances into simple inorganic substances. These substances are used up once more by the plants / Decomposers help in the natural replenishment of the soil.
- c) Ozone layer shields the surface of the earth from ultraviolet radiation from the sun. This radiation is highly damaging to organisms.

7. a) How does menstruation occur? (SEP 2020)

b) How the process of budding in hydra is different from Bryophyllum?

Ans : a) The uterus prepares itself every month to receive a fertilized egg and thus its lining becomes thick and spongy.

If the egg is not fertilized, the lining slowly breaks and comes out through the vagina as blood and mucous.

- b) In hydra, a bud develops as an outgrowth due to repeated cell division at one specific site. These buds develop into tiny individuals and when fully mature, detach from the parent body and become new independent individuals.

In Bryophyllum, buds are produced in the notches along the leaf margin. These buds fall on the soil and develop into new plants.

8. (SEP 2020)

- 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?

Ans : a) The fertilized egg 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 develop organs to become foetus.

- b) If the vas deferens in the man is blocked, sperm transfer will be prevented. Fertilisation will not take place.

If the fallopian tube in the woman is blocked, the egg will not be able to reach the uterus. Fertilisation will not take place.

9. When a tall (TT) pea plant is crossed with a dwarf (tt) pea plant, represent the result obtained in F₂ generation of monohybrid cross with the help of checker board and mention the ratio of varieties of plants. (APRIL 2022)

Ans :

Gametes	T	t
T	TT	Tt
t	Tt	tt

Ratio : TT : Tt : tt

1 : 2 : 1

OR

Tall : Dwarf

3 : 1

10. What is trophic level? Flow of energy in an ecosystem is always unidirectional. Why? Explain. (APRIL 2022)

Ans : Different levels / stages of food chain. Because,

- The energy that is captured by autotrophs does not revert back to the solar input.
- The energy which passes to the herbivores do not come back to autotrophs.
- As energy moves progressively through the various trophic levels it is no longer available to the previous level.
- At different levels energy is lost in the form of heat.

11. What is pollination? What are the changes that occur in the flower after pollination? (APRIL 2023)

Ans: The transfer of pollen from the stamen to the stigma.

- Germination of the pollen : Pollen tube develops.
- Fertilization: Pollen grain enters the ovary through pollen tube and fuses with the ovum / egg. Zygote is formed.
- Ovum develops into seed. Ovary grows rapidly and ripens into fruit.
- Petals, sepals, stamen, style and stigma may shrivel and fall off.

12. Tall pea plant producing red flowers (TT RR) is crossed with short pea plant producing white flowers (tt rr). (APRIL 2023)

i) Mention the type of plants produced from these plants in the F₁ generation.

ii) Write the ratio of plants obtained in the F₂ generation by crossing the plants of F₁ generation and name the varieties of plants obtained.

Ans : i) Parents : TT RR × tt rr

Gametes : TR × tr

F₁ generation : Tt Rr

OR

Hybrid mixed red flowers producing tall pea plants.

ii) Ratio = 9 : 3 : 3 : 1

Types of plants

- a) 9-Tall — Red flowers producing pea plants
- b) 3-Tall — White flowers producing pea plants
- c) 3-Short — Red flowers producing pea plants
- d) 1-Short — White flowers producing pea plant

13. Round, green colour seeds producing pea plant (RR yy) are crossed with wrinkled, yellow colour seeds producing pea plant (rr YY). Show the result of F₂ generation with the help of a checker board and mention the ratio of varieties of plants. (JULY 2023)

Ans. :

Ans: F₂ RrYy × RrYy

	<i>RY</i>	<i>Ry</i>	<i>rY</i>	<i>ry</i>
<i>RY</i>	<i>RRYY</i>	<i>RRYy</i>	<i>RrYY</i>	<i>RrYy</i>
<i>Ry</i>	<i>RRYy</i>	<i>RRyy</i>	<i>RrYy</i>	<i>Rryy</i>
<i>rY</i>	<i>RrYY</i>	<i>RrYy</i>	<i>rrYY</i>	<i>rrYy</i>
<i>ry</i>	<i>RrYy</i>	<i>Rryy</i>	<i>rrYy</i>	<i>rryy</i>

Round, yellow = 9

Round, green = 3

Wrinkled, yellow = 3

Wrinkled, green = 1

14. How are the traits of organisms classified as 'dominant' and 'recessive' traits ? The experiences of an individual acquired during its life-time cannot be passed on to its progeny. Why? (JULY 2023)

Ans: ➤ Among the two copies of genes related for a trait, if one of the traits expressed in many generations / offspring, then that trait is dominant.
➤ Among paired traits which of the traits not expressed or less expressed in a few of the generations / organisms, then that trait is recessive.
➤ Change in non-reproductive tissues cannot be passed on to the DNA of germ cells.

15. "Reaching to sexual maturation is an essential event with respect to mammals like humans." Substantiate this statement. (JULY 2023)

Ans: Reaching sexual maturation.

In males :

- Development of testes helps to produce sperm / testosterone
- For reproduction requires development of testes
- To have secondary sexual characters.
- During intercourse erection of penis helps to transfer germ cells into the female body

In females :

- To cause menstrual cycle
- For the production and release of ovum
- For the secretion of women related hormones like estrogen
- For the growth of breasts to feed the baby after a child birth.

16. Explain the stages of 'double circulation' of the blood in humans. (JULY 2022)

Ans: Transportation of blood in heart:

- Oxygen-rich blood from the lungs comes to the left atrium.
- When the left atrium relaxes and contracts then blood gets transferred to left ventricle.
- When the left ventricle contracts the blood is pumped out to the body through aorta.
- De-oxygenated blood comes from the body to the right atrium.
- As the right atrium contracts the blood get transferred to the right ventricle.
- On contraction of right ventricle, the blood go to the lungs for oxygenation.

17. Mention the events that occur during photosynthesis in plants. What are the methods used by plants to get rid of excretory products? (JULY 2022)

Ans: ➤ Absorption of sunlight by chlorophyll.

- Conversion of light energy into chemical energy / decomposition of water into oxygen and hydrogen molecule.
- Reduction of carbon dioxide into carbohydrate.

Methods to get rid of excretory products in plants:

- Excess of water removed by transpiration
- Remove oxygen and carbon dioxide gases through stomata
- Waste products and dead cells in vacuoles by shedding leaves / barks
- Resins and gums get stored in old xylem
- Diffusing certain wastes into surrounding soil.

18. How does uterus prepare to receive the fertilized egg in woman? What happens if egg does not fertilise? Explain. (JULY 2022)

Ans: ➤ Uterus prepares itself every month to receive fertilized egg. It makes its inner layer thick and spongy.
➤ If the egg is not fertilized, it lives for about one day.
➤ If fertilization doesn't occur the lining slowly breaks and comes out through the vagina as blood and mucous.

19. "An individual organism cannot pass the experiences acquired during its life time to the progenies of the next generation." Explain this concept with the help of an illustration. (JULY 2022)

Ans: ➤ Change in non-reproductive tissues cannot be passed on to the DNA of the germ cells.
➤ For example, if we breed a group of mice all their progeny will have tails, as expected.
Now, if the tails of these mice are removed by surgery in each generation, the tailless mice produce tailed progeny.
➤ Because, removal of the tail cannot change the genes of the germ cells of the mice.

20. Pure 'short' pea plant is crossed with pure 'tall' pea plant. Represent the results obtained in F₂ generation with the help of checker board and mention the ratio of the types of plants obtained. (JULY 2022)

Ans: Result of F₂ generation :

Gametes	T	t
T	TT	Tt
t	Tt	tt

Ratio obtained in F₂ generation :

Pure tall : tall : Pure dwarf
1 : 2 : 1

OR
Tall : dwarf
3 : 1

FOUR MARKS QUESTIONS

1. Name the given structure. 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? (APRIL 2020)

Ans: ➤ 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) *Effectors:* Which shows the sudden visible response.

Reflex arcs have evolved in animals because the thinking process of brain is not fast 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 thought process and increase the chance of survival.

2. The plant bearing round yellow coloured (*RrYy*) seed are self-pollinated with the same plant. Represent the result obtained in the *F₂* generation of dihybrid cross with the help of a checker board. Mention the varieties of plants obtained in *F₂* generation. (APRIL 2020)

Gametes	<i>RY</i>	<i>Ry</i>	<i>rY</i>	<i>ry</i>
<i>RY</i>	<i>RRYY</i>	<i>RRYy</i>	<i>RrYY</i>	<i>RrYy</i>
<i>Ry</i>	<i>RRYy</i>	<i>RRyy</i>	<i>RrYy</i>	<i>Rryy</i>
<i>rY</i>	<i>RrYY</i>	<i>RrYy</i>	<i>rrYY</i>	<i>rrYy</i>
<i>ry</i>	<i>RrYy</i>	<i>Rryy</i>	<i>rrYy</i>	<i>rryy</i>

The plants obtained are

Round yellow—9

Round green—3

Wrinkled yellow—3

Wrinkled green—1

3. Which molecule is formed during the first step of cellular respiration by the breakdown of glucose molecule in cytoplasm? Mention the types of respiration and write any two differences between them. (APRIL 2022)

Ans: Pyruvate.

Two types :

- i) Aerobic respiration
- ii) Anaerobic respiration

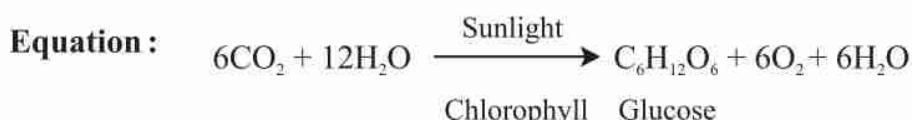
<i>Aerobic respiration</i>	<i>Anaerobic respiration</i>
★ Atmospheric oxygen is utilised	★ Atmospheric oxygen is not utilised
★ Liberates more energy with carbon dioxide and water	★ Liberates less energy with ethanol and carbon dioxide
★ Takes place in mitochondria	★ Takes place in cytoplasm
★ Takes place in higher levels of organisms	★ Takes place in lower organisms like yeast.

4. Which are the factors essential for photosynthesis? Mention the events that occur during this process and represent this process by balanced chemical equation. (APRIL 2022)

Ans: Factors essential for photosynthesis: Carbon dioxide, water, minerals, sunlight and chlorophyll.

Events that occur during photosynthesis :

- i) Absorption of light energy by chlorophyll.
- ii) Conversion of light energy into chemical energy.
- iii) Splitting of water molecules into hydrogen and oxygen molecules.
- iv) Reduction of carbon dioxide into carbohydrates.



5. Explain the digestion of food materials in stomach and small intestine. (APRIL 2023)

Ans: Stomach:

- Gastric glands present in the wall of the stomach release hydrochloric acid, pepsin and mucus.
- Hydrochloric acid creates an acidic medium which facilitates the action of pepsin.
- Pepsin digests protein.

Small intestine:

- It receives pancreatic juice and bile juice. Bile juice makes the food alkaline.
- Bile salts emulsify the fats in the small intestine.
- Trypsin present in pancreatic juice helps to digest the proteins.
- Lipase breaks down the emulsified fats.
- Enzymes present in the small intestinal juice convert proteins into amino acids, complex carbohydrates into glucose and fats into fatty acids and glycerol.

6. Explain the role of xylem and phloem tissues in the transportation of materials in plants. (APRIL 2023)

Ans: Xylem : Water conducting tissue.

- In xylem tissue, vessels and tracheid's of the roots, stem and leaves are interconnected to form a continuous system of water-conducting channel reaching all parts of the plant.
- Transpiration (loss of water through stomata) creates suction pressure and creates a column of water.
- This steadily pushes the water upward with dissolved minerals in it.

Phloem : Food conducting tissue.

- Phloem translocates soluble products of photosynthesis, amino acids and other substances from the leaves to storage organs of roots, fruits and seeds, and to the growing organs.
- Translocation takes place in sieve tube with the help of companion cell, both in upward and downward directions.
- Osmotic pressure helps water to move into the phloem tissue and moves other materials from the phloem to other tissues.

7. a) As the growth advances in a climbing plant (creeper) that appears as the plant is moving towards a particular direction. How? (JULY 2023)

Ans : For a touch / thigmotropism, when the tendrils of creeper plants come in contact with a support, the plant circles around it and grows faster.

When tendrils get attached to a support then, tips of the plant synthesise auxin hormone at higher concentration and stimulates the elongation of cells, then the plant shows directional movement/growth towards light.

- b) Explain the necessity of chemical communication in animals. (JULY 2023)

Ans : In animals chemical communication is necessary.

- In animals' electrical impulses will reach only the cells that are connected by nervous tissue but not each and every cell.
- Nerve cells cannot create and transmit electrical impulses continuously therefore, chemical communication is necessary in transmitting stimulus continuously to each and every cell.

8. a) Compare the functions of xylem tissue with that of phloem tissue. (JULY 2023)

Xylem	Phloem
★ Transport water and minerals / inorganic materials	★ Transport food / organic materials
★ Flow of materials is unidirectional	★ Flow of materials is in two directions (upward and downward)
★ Xylem tracheids and vessels transport materials from root to shoot	★ Sieve tube and companion cells transport materials to all the parts from leaves
★ Works by suction pressure	★ Works by osmotic pressure

- b) Explain the process of exchange of gases that take place through stomata in plants. (JULY 2023)

Ans : ➤ In plants the large intercellular spaces and all the cells are oftenly in contact with air, due to this CO₂ and oxygen are exchanged by diffusion here. This means
 ➤ Gases can go into cells and away from them and out into the air / atmosphere.

9. a) How is the structure of human heart supportive in transporting oxygenated blood and deoxygenated blood? Explain. (JULY 2023)

Ans : Human heart

- Has different chambers
- The valves present in between the chambers prevent backward flow of blood

- Separated by dividing wall septum
- Septum is responsible for creating separate pathways to transport oxygenated and deoxygenated blood.

b) In humans, how is the digested food absorbed by the blood? Mention the function of blood in transporting necessary materials. (JULY 2023)

- Ans :**
- Absorbed by finger like projections Villi present in small intestine
 - Blood plasma—transports food, carbon dioxide and nitrogen wastes
 - RBC—Carries oxygen
 - Many other substances like salts are also transported by blood.
