10th standard Science one marks Answer key

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TRUE OR FALSE (UNIT WISE)

LAWS OF MOTION

1	False (No External force is applied)
2	False (not equal)
3	False (Lesser at the equator and Greater at the polar region)
4	False (Longer handle is so easy than one with shorter handle.
5	False (Apparent weight is zero. They are in state of weightlessness.

OPTICS

1	False (Velocity of light is greater in rare medium than in denser medium.)
2	True
3	True
4	False (concave lens)

THERMAL PHYSICS

1	False (the real expansion is more or less than that of apparent expansion)
2	True
3	False (the volume is directly proportional to temperature).

ELECTRICITY

1	False (between the potential difference and current.)
2	True
3	False (Ampere)
4	False (1000watt hour)
5	False (greater than the highest of the individual resistance)

ACOUSTICS

1	False (Sound can travel through solids, gases, liquids and cannot through vacuum.)
2	True
3	False (The velocity of sound is dependent of temperature.)
4	False (The Velocity of sound is less in gases than liquids.)

NUCLEAR PHYSICS

1	True
2	False. (Elements having atomic number lesser than 83can undergo nuclear fusion)
3	False. (Nuclear fission is more dangerous than Nuclear fusion).
4	False. (Natural plutonium is the core fuel used in a nuclear reactor)
5	True
6	True
7	True

ATOMS AND MOLECULES

1	True
2	False. Monoatomic.
3	False. Relative atomic mass of an element has unit (kg).
4	True
5	False. 44 g.

PERIODIC CLASSIFICATION OF ELEMENTS

1	False. Mosley's periodic table is based on atomic numbers.
2	False. Ionic radius decreases across the period from left to right.
3	True
4	False. Aluminium wires are used as electric cables due to their good conductor of heat and electricity.
5	False. An alloy is a homogeneous mixture of metals.

SOLUTIONS

1	False. Solutions which contains two components are called binary solution.
2	False. In a solution, the component which is present in higher amount is called solvent.
3	False. Sodium chloride dissolved in water forms a aqueous solution.
4	False. The molecular formula of epsom salt is $MgSO_4.7H_2O$.
5	True

TYPES OF CHEMICAL REACTIONS

1	False. Silver metal cannot displace hydrogen gas from Nitric acid
2	True.
3	True
4	True
5	True

PLANT ANATOMY AND PLANT PHYSIOLOGY

1	False. Phloem tissue is involved in the transport of food in plant.
2	True
3	False. In dicot stem cambium is present in between xylem and phloem.
4	False. Palisade parenchyma cells occur below upper epidermis in dicot leaf.
5	True
6	False. Aerobic respiration produces more ATP than anaerobic respiration.

STRUCTURAL ORGANISATION OF ANIMALS

1	False. An anticoagulant present in saliva of leech is called hirudin.
2	False. The vas deferens serves to transport the sperms.
3	False. The rabbit has a third eyelid called Nictitating membrane which is movable.
4	False. Diastema is a gap between the incisors and premolar teeth in rabbit.
5	False. The cerebral hemispheres of rabbit are connected by band of nerve tissue called corpus callosum.

TRANSPORTATION IN PLANTS AND CIRCULATION IN ANIMALS

1	True
2	True
3	False The form of sugar transported through the phloem is Sucrose.
4	False In symplastic movement the water travels through the cell membrane and enter the cell.
5	False When the guard cells lose water the stoma closes.
6	False Initiation and stimulation of heart beat takes place by Sino – atrial (SA) node.
7	False All veins, except pulmonary vein, carry deoxygenated blood.
8	True
9	True

NERVOUS SYSTEM

1	False Axon is the longest fibres that conducts impulses away from the cell body.
2	False Sympathetic nervous system is a part of Autonomic nervous system.
3	True
4	False Cerebellum controls the voluntary actions of our body.
5	True
6	False All the nerves in the body are covered and protected by Epineurium.
7	True
8	True
9	True

PLANT AND ANIMAL HORMONES

1	True
2	True
3	False. Ethylene hastens senescence of leaves, flowers and fruits.
4	True
5	False. Pituitary gland is divided into two lobes.
6	False. Estrogen is secreted by Graafian follicles.

REPRODUCTION IN PLANTS AND ANIMALS

1	False. Stalk of the ovule is called funiculus.
2	False. Seeds are the product of sexual reproduction.
3	False. Yeast reproduces asexually by means of budding.
4	False. The part of the pistil which serves as a receptive structure for the pollen is called as stigma.
5	False. Wind pollinated flowers are characterized by dry and smooth pollen.
6	False. Sex organs produce gametes which are haploid.
7	False. LH is secreted by the anterior pituitary.
8	True
9	False. Surgical methods of contraception prevent gametes transportation.
10	False. The decreased level of estrogen and progesterone is responsible for menstruation.

HEREDITY

1	False. A typical Mendelian dihybrid ratio of F2 generation is 9 : 3: 3 : 1.
2	False. A recessive factor is masked by the presence of a dominant factor.
3	True
4	True
5	False. Some of the chromosomes have an elongated knob-like appendages known as Satellite .
6	True

ORIGIN AND EVOLUTION OF LIFE

1	False. The use and disuse theory of organs' was postulated by Jean Baptiste Lamarck.
2	False. The analogous organs look similar and perform similar functions but they have different origin and developmental pattern.
3	True

BREEDING AND BIOTECHNOLOGY

1	True
2	False. The process of producing an organism with more than two sets of chromosome is called Polyploidy breeding.
3	False. A group of plants produced from a single plant through vegetative or asexual reproduction are called Clones.
4	False. Amino acid fortified rice variety determines the protein quality of the cultivated plant.
5	False. Golden rice is a Genetically modified crop
6	True
7	False. In vitro fertilisation means the fertilisation done outside the body.
8	True
9	False. Molecular scissors refers to Restriction Endonucleases.

HEALTH AND DISEASES

1	True
2	True
3	False. Cancer is characterized by tumour formation.
4	False. In leukemia WBC's increase in number.
5	True
6	True
7	False. Type 1 diabetes mellitus results due to insulin deficiency
8	True
9	True
10	False. Cirrhosis is associated with liver disorder.

ENVIRONMENTAL MANAGEMENT

1	False. Correct statement : Biogas is a Bio-fuel.
2	True
3	True
4	False. Nuclear energy is a non-renewable energy.
5	False. Overgrazing increases soil erosion.
6	False. Poaching of wild animals is a illegal act.
7	True
8	True

UNIT 1 LAWS OF MOTION

III. Answer briefly.

1. Define inertia. Give its classification.

This law states that everybody continues to be in its state of rest or the state of uniform motion along a straight line unless it is acted upon by some external force.

Classification of interia:

1. Inertia of rest, 2. Inertia of motion 3. Inertia of direction

2. Classify the types of force based on their application.

(a) Like parallel forces

(b) Unlike parallel forces

3. If a 5 N and a 15 N forces are acting opposite to one another. Find the resultant force and the direction of action of the resultant force.

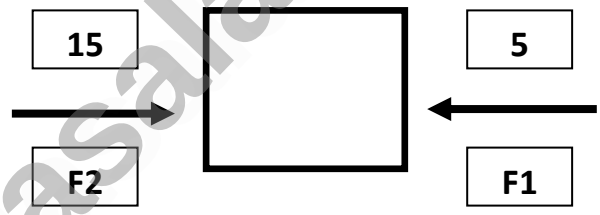
Given:- F_1 = 5N

F_2 =15N

Resultant force = Fnet = $F_2 - F_1$

= 15 -5

=10N



F net is directed along the greater force,(F_2).

4. Differentiate mass and weight.

S.no	Mass	Weight
1	Fundamental quantity	Derived quantity
2	Its unit is Kg	Its unit is Newton
3	It is measured by physical balance	It is measured by spring balance
4	Scalar quantity	Vector quantity

5. Define moment of a couple.

- The line of action of the two forces does not coincide.
- It does not produce any translatory motion since the resultant is zero.
- But a couple results in causes the rotation of the body.
- Rotating effect of a couple is known as moment of a couple.

6. State the principle of moments.

- At equilibrium, the algebraic sum of the moments of all the individual forces about any point is **equal to zero**.

7. State Newton's second law.

- The force acting on a body is directly proportional to the rate of change of linear momentum of the body and the change in momentum takes place in the direction of the force.

8. Why a spanner with a long handle is preferred to tighten screws in heavy vehicles?

- When the handle of the spanner is long, the force required to turn the body is less.
- The turning effect of a body depends upon the perpendicular distance of the line of action of the applied force from the axis of rotation.

Moment of force = F x d

- Hence, the spanner has a long handle is preferred to tighten screws in heavy vehicle.

9. While catching a cricket ball the fielder lowers his hands backwards. Why?

- A fielder experiences a smaller force for a longer interval of time to catch the ball, resulting in a less impulse on his hands.

10. How does an astronaut float in a space shuttle?

- Astronaut are not floating but falling freely around the earth due to the huge velocity.
- They are in the state of weightlessness.

VIII. Answer in detail.

1. What are the types of inertia? Give an example for each type.

Types of Inertia

a) Inertia of rest:

- The resistance of a body to change its **state of rest** is called inertia of rest.

  E.g: When you vigorously shake the branches of a tree, some of the leaves and fruits are detached and they fall down.

b) Inertia of motion:

- The resistance of a body to change its **state of motion** is called inertia of motion.

  E.g: An athlete runs some distance before jumping. Because, this will help him jump longer and higher

c) Inertia of direction:

- The resistance of a body to change its **direction of motion** is called inertia of direction.

  E.g: When you make a sharp turn while driving a car, you tend to lean sideways.

2. State Newton's laws of motion? (Sep 2021)

Newton's First Law:

- This law states that everybody continues to be in its state of rest or the state of uniform motion along a straight line unless it is acted upon by some external force.

Newton's second law:

- The force acting on a body is directly proportional to the rate of change of linear momentum of the body and the change in momentum takes place in the direction of the force.

Newton's third law:

- Newton's third law states that 'for every action, there is an equal and opposite reaction.
- They always act on two different bodies'

3. Deduce the equation of a force using Newton's second law of motion.

Initial momentum of the body Pi = mu

Final momentum of the body Pf = mv

Change in momentum Δp = $P_f - P_i$

= mv – mu

By Newton's second law of motion, Force, F ∝ rate of change of momentum

F ∝ change in momentum / time

$$F \propto \frac{mv - mu}{t} \qquad F \propto \frac{m(v-u)}{t}$$

$$F = \frac{K\, m(v-u)}{t}$$

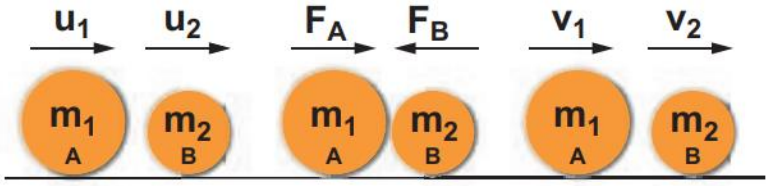
$$F = \frac{m(v-u)}{t}$$

Since, acceleration = change in velocitytime, **a = (v-u) / t**. Hence, we have

F= m x a

Force = mass × acceleration

4. State and prove the law of conservation of linear momentum.



Force on body B due to A, FB = $m_2 (v_2 – u_2) / t$

Force on body A due to B, FA = $m_1 (v_1 – u_1) / t$

By Newton's III law of motion,

Action force = Reaction force FA = – FB

$$m_1 (v_1 - u_1) / t = – m_2 (v_2 - u_2) / t$$

$$m_1v_1 + m_2v_2 = m_1u_1 + m_2u_2$$

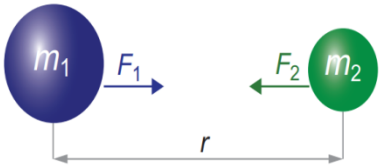
- The above equation confirms in the absence of an external force, the algebraic sum of the momentum after collision is numerically equal to the algebraic sum of the momentum before collision.

5. Describe rocket propulsion. (Sep 2021)

- Propulsion of rockets is based on the law of conservation of linear momentum as well as Newton's III law of motion.
- Rockets are filled with a fuel (either liquid or solid) in the propellant tank.
- When the rocket is fired, this fuel is burnt and a hot gas is ejected with a high speed from the nozzle of the rocket producing a huge momentum.
- To balance this momentum, an equal and opposite reaction force is produced in the combustion chamber, which makes the rocket project forward.
- While in motion, the mass of the rocket gradually decreases, until the fuel is completely burnt out.
- The mass of the rocket decreases with altitude, which results in the gradual increase in velocity of the rocket.
- At one stage, it reaches a velocity, which is sufficient to just escape from the gravitational pull of the Earth.

6. State the universal law of gravitation and derive its mathematical expression.

- This law states that every particle of matter in this universe attracts every other particle with a force.
- This force is directly proportional to the product of their masses and inversely proportional to the square of the distance between the centers of these masses.



- The direction of the force acts along the line joining the masses.

Let, m_1 and m_2 be the masses of two bodies A and B placed r metre apart in space

Force $F \propto m_1 \times m_2$

$F \propto 1/r^2$

On combining the above two expressions

$$F \propto \frac{m_1 \times m_2}{r^2}$$

$$\mathbf{F = \frac{G\, m_1\, m_2}{r^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots (1.10)$$

Where G is the universal gravitational constant. Its value in SI unit is 6.674×10^{-11} N $m^2 kg^{-2}$.

7. Give the applications of universal law gravitation.

- Helps in discovering new stars and planets.
- Helps to predict the path of the astronomical bodies.
- The mass of the star can be calculated using the law of gravitation.
- Dimensions of the heavenly bodies can be measured using the gravitation law.
- Helps to explain germination of roots is due to the property of geotropism which is the property of a root responding to the gravity.

ADDITIONAL QUESTIONS:

1. Write a short note on gears? (Sep 2020)

- A gear is a circular wheel with teeth around its rim.
- It helps to change the speed of rotation of a wheel by changing the torque and helps to transmit power.

2. Explain the types of force? {Rev –I (2022)}

- Based on the direction in which the forces act, they can be classified into two types as: (a) Like parallel forces and (b) Unlike parallel forces.
- **(a) Like parallel forces :** Two or more equal forces acting along the same direction.
- **(b) Unlike parallel forces :** If two or more equal forces act along opposite directions
- **Balanced forces :** If the resultant force is equal to zero.
- **Unbalanced forces :** If the resultant force is not equal to zero.

LESSON 2 OPTICS

IV. Answer Briefly:

1. What is refractive index?

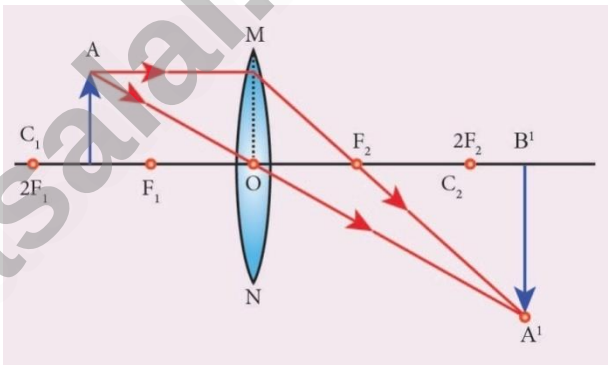
- Refractive index gives us an idea of how fast or how slow light travels in a medium. The ratio of speed of light in vacuum to the speed of light in a medium is defined as refractive index 'μ' of that medium.

2. State Snell's law.

- The ratio of the sine of the angle of incidence and sine of the angle of refraction is equal to the ratio of refractive indices of the two media. This law is also known as Snell's law.

$$\frac{\sin i}{\sin r} = \frac{\mu 2}{\mu 1}$$

3. Draw a ray diagram to show the image formed by a convex lens when the object is placed between F and 2F.



4. Define dispersion of light.

- When a beam of white light or composite light is refracted through any transparent media such as glass or water, it is split into its component colours. This phenomenon is called as 'dispersion of light'.

5. State Rayleigh's law of scattering.

- Rayleigh's scattering law states that, "The amount of scattering of light is inversely proportional to the fourth power of its wavelength".
- Amount of scattering 'S' α 1 / λ 4

6. Differentiate convex lens and concave lens.

Convex lens	Concave lens
A convex lens is thicker in the middle than at edges.	A concave lens is thinner in the middle than at edges.
It is a converging lens.	It is a diverging lens.
It is used to treat hypermeteropia.	It is used to treat myopia.

7. What is power of accommodation of eye?

- The ability of the eye lens to focus nearby as well as the distant objects is called power of accommodation of the eye.

8. What are the causes of 'Myopia'?

- Myopia occrs when the eyeball is too long, relative to the focusing power of the cornea and lens of the eye.

9. Why does the sky appear in blue colour?

- When sunlight passes through the atmosphere, the **blue colour** (shorter wavelength) is **scattered to a greater extent** than the red colour (longer wavelength). This scattering causes the sky to appear in blue colour.

10. Why are traffic signals red in colour?

- Red colour has longest wavelength. Since it is visible from a long distance.
- Then red light is scattered the least by air molecules.

VII. Give the answer in detail

1. List any five properties of light

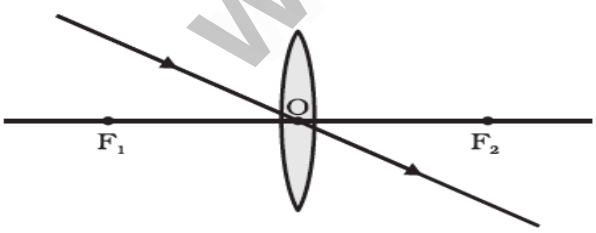
- Light is a form of energy.
- Light always travels along a straight line.
- The speed of light in vacuum or air is, $c = 3\times10^8\ ms^{-1}$.
- Different coloured light has different wavelength and frequency.
- Among the visible light, violet light has the lowest wavelength and red light has the highest wavelength.
- light is in the form of waves $c = \nu\lambda$. (c - velocity of light, wavelength (λ), frequency (ν)).
- When light is incident on the interface between two media, it is partly reflected and partly refracted.

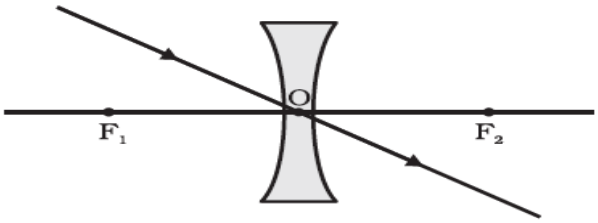
2. Explain the rules for obtaining images formed by a convex lens with the help of ray diagram.

Rule-3: When rays strikes at optical centre

Convex lens – Travel without any deviation

Concave lens - Travel without any deviation

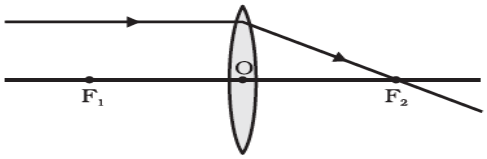


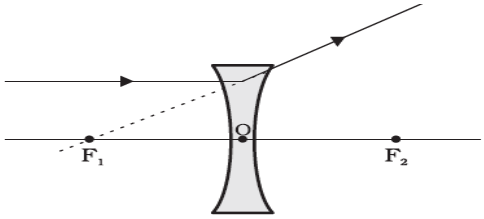


Rule-2: When parallel rays strikes to the principal axis

Convex lens – Converged ;

Concave lens - Diverged

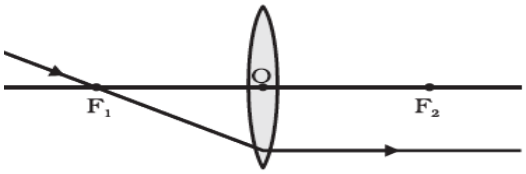


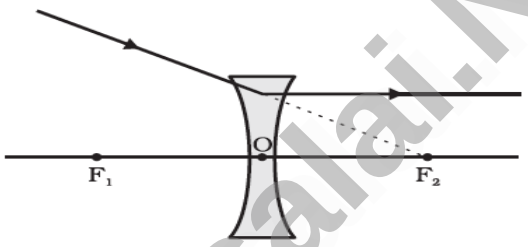


Rule-3: When rays strikes to the principal focus

Convex lens – parallel to the principal axis;

Concave lens - parallel to the principal axis





3. Differentiate the eye defects: Myopia and Hypermetropia

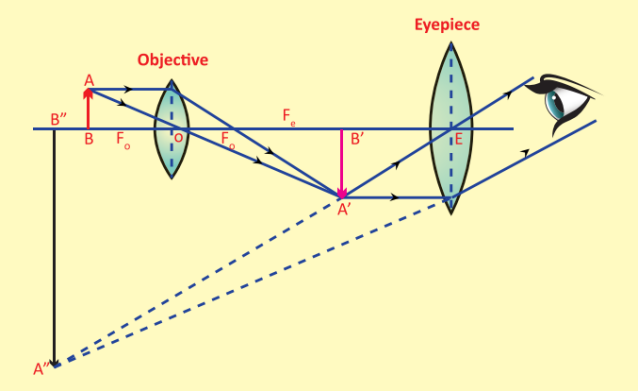
Myopia	Hypermetropia
Short sightedness	Long sightedness
Nearby objects can be seen clearly but distant object cannot be seen clearly	Distant objects can be seen clearly but nearby object cannot be seen clearly
Image fall before the retina	Image fall behind retina
The distance between eye lens and retina increases	The distance between eye lens and retina decreases
Treated by using concave lens	Treated by convex lens

4. Explain the construction and working of a 'Compound Microscope'.

Construction:

- It has two convex lenses.
- Objective lens – placed near the object.
- Eye lens – Placed near the eye.

Working:



- The object AB is placed in a slighter distance of objective lens.
- An inverted and real image formed (A^IB^I).
- Adjust the eye ball to fall (A^IB^I) in eye lens.
- An enlarged and erect image is formed ($A^{II}B^{II}$).

ADDITIONAL QUESTIONS:

1. Write the uses of Convex lenses.(Rev-1 2022)

- Convex lenses are used as camera lenses.
- They are used as magnifying lenses.
- They are used in making microscope, telescope and slide projectors.
- They are used to correct the defect of vision called hypermetropia

2. Write the uses of Concave lenses.

- Concave lenses are used as eye lens of 'Galilean Telescope'
- They are used in wide angle spy hole in doors.
- They are used to correct the defect of vision called 'myopia

3. Explain the structure of Human Eye.

- **Cornea** - Thin transparent layer. It refracts or bends the light on to the lens.
- **Iris** - It is the coloured part of the eye. Iris controls amount of light entering into the pupil.
- **Pupil** - It is the centre part of the Iris. It is the pathway for the light to retina.
- **Retina** - back surface of the eye - most sensitive part of eye- real and inverted image of objects is formed.
- **Sclera** - It helps to change the focal length of the eye lens according to the position of the object.
- **Eye lens** - It is convex in nature.

LESSON 3 THERMAL PHYSICS

VI. Answer in briefly

1. Define one calorie.

- Calorie: One calorie is defined as the amount of heat energy required to rise the temperature of 1 gram of water through 1°C.

2. Distinguish between linear, arial and superficial expansion.

Linear Expansion	Arial Expansion	Cubical Expansion
If there is an increase in the length of a solid object due to heating, then the expansion is called longitudinal or linear expansion	If there is an increase in the area of a solid object due to heating, then the expansion is called superficial or areal expansion	If there is an increase in the volume of a solid body due to heating, then the expansion is called cubical or volumetric expansion.
$\Delta L / L_o = \alpha L \Delta T$	$\Delta A / A_o = \alpha A \Delta T$	$\Delta V / V_o = \alpha v \Delta T$

3. What is co-efficient of cubical expansion?

- The ratio of increase in volume of the body per degree rise in temperature to its unit volume is called as coefficient of cubical expansion. This is also measured in K–1.

$$\alpha v = \Delta V / V_o \Delta T$$

4. State Boyle's law

- When the temperature of a gas is kept constant, the volume of a fixed mass of gas is inversely proportional to its pressure.

$$P \alpha 1/V \text{ (OR) } PV = \text{constant}$$

5. State-the law of volume

- According to this law, When the pressure of gas is kept constant, the volume of a gas is directly proportional to the temperature of the gas.

$$V \alpha T \text{ (OR) } V / T = \text{constant.}$$

6. Distinguish between ideal gas and real gas.

Ideal gas	Real gas
atoms or molecules of a gas do not interact with each other	atoms or molecules of a gas interact with each other
intermolecular forces of attraction are weak	No intermolecular forces of attraction

7. What is co-efficient of real expansion?

- Coefficient of real expansion is defined as the ratio of the true rise in the volume of the liquid per degree rise in temperature to its unit volume.
- The SI unit of coefficient of real expansion is K^{-1}.

8. What is co-efficient of apparant expansion?

- Coefficient of apparent expansion is defined as the ratio of the apparent rise in the volume of the liquid per degree rise in temperature to its unit volume.
- The SI unit of coefficient of apparent expansion is K^{-1}.

VIII. Answer in detail

1. Derive the ideal gas equation.

- The ideal gas equation is an equation, which relates all the properties of an ideal gas. An ideal gas obeys Boyle's law and Charles' law and Avogadro's law.

According to Boyle's law,

$$PV = \text{constant}$$

According to Charles's law,

$$V / T = \text{constant}$$

According to Avogadro's law,

$$V/n = \text{constant}$$

After combining equations we can get the following equation.

$$PV/nT = \text{constant}$$

$$PV / \mu NA\ T = \text{constant}$$

$$PV / \mu NA\ T = K_B$$

$$PV = \mu NA\ K_B\ T$$

$$PV = RT$$

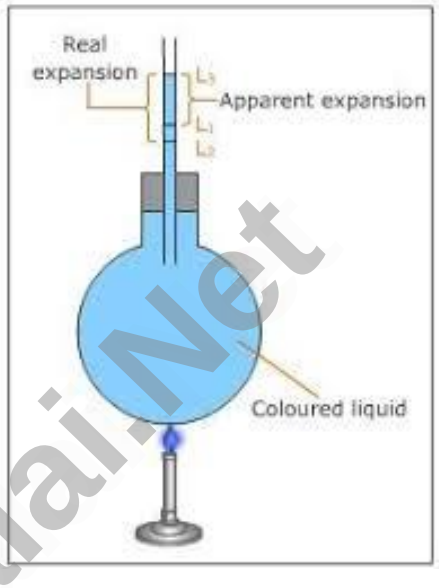
$n = \mu N$

$\mu NA\ K_B = R$

- Ideal gas equation is also called as equation of state because it gives the relation between the state variables and it is used to describe the state of any gas.

2. Explain the experiment of measuring the real and apparent expansion of a liquid with a neat diagram.

- To start with, the liquid whose real and apparent expansion is to be determined is poured in a container up to a level. Mark this level as L1.
- Now heat the container by using burner.
- As a result, the volume of the liquid appears to have reduced. Mark this reduced level of liquid as L2.
- On further heating, liquid through the container results in the expansion of the liquid.
- Hence, the level of liquid rises to L3
- The difference between the levels L1 and L3 is called as apparent expansion.
- The difference between the levels L2 and L3 is called as real expansion.



Real expansion = L3 – L2

Apparent expansion = L3 – L1

UNIT 4 ELECTRICITY

VI. Very short answer questions.

1. Define the unit of current.

- The current flowing through a conductor is said to be one ampere, when a charge of one coulomb flows across any cross-section of a conductor, in one second.
- 1 ampere =1 coulomb / 1 second.

2. What happens to the resistance, as the conductor is made thicker?

- As the resistance is inversely proportional to the area, (R α 1/A) thick wires will cause low resistance.

3. Why is tungsten metal used in bulbs, but not in fuse wires?

- Tungsten have very high melting point.
- Fuse wires are having low melting point.
- If tungsten is used as a fuse wire, then it will not melt even when large amount of current is passed through it , and the appliance will be damaged.

4. Name any two devices, which are working on the heating effect of the electric current.

- Electric Heater
- Electric Iron.

VII. Short answer questions

1. Define electric potential and potential difference.

Electrical potential:

- The electric potential at a point is defined as the amount of work done in moving a unit positive charge from infinity to that point against the electric force.

Electric potential Difference:

- The electric potential difference between two points is defined as the amount of work done in moving a unit positive charge from one point to another point against the electric force.

2. What is the role of the earth wire in domestic circuits?

- This wire provides a low resistance path to the electric current.
- The earth wire serves as a protective conductor, which saves us from electric shocks

3. State Ohm's law.

- According to Ohm's law, at a constant temperature, the steady current 'I' flowing through a conductor is directly proportional to the potential difference 'V' between the two ends of the conductor. I α V. Hence, I/V = constant.

4. Distinguish between the resistivity and conductivity of a conductor

Resistivity	Conductivity
The Electrical resistivity of a material is defined as the resistance of a conductor of unit length and unit area of cross section. Its unit is ohm metre.	The reciprocal of electrical resistivity of a material is called its electrical conductivity. Its unit is $Ohm^{-1}\ m^{-1}$ or $mho\ m^{-1}$

5. What connection is used in domestic appliances and why?

- The connections in houses for domestic appliances are parallel so that even disconnection of one circuit does not affect the other circuit.
- To get equal voltages for all appliances, parallel circuit is used.

VIII. Long answer questions.

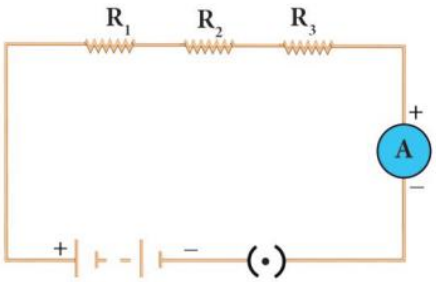
1. With the help of a circuit diagram derive the formula for the resultant resistance of three resistances connected:

a) in series and b) in parallel

- Let, three resistances R1, R2 and R3 be connected in series.
- According to Ohm's Law, the potential differences V1, V2 and V3 across R1, R2 and R3 respectively, are given by:

$$V_1 = I R_1 \longrightarrow (1)$$
$$V_2 = I R_2 \longrightarrow (2)$$
$$V_3 = I R_3 \longrightarrow (3)$$
$$V = V_1 + V_2 + V_3$$
$$V = I R_1 + I R_2 + I R_3 \longrightarrow (4)$$
$$V = I R_s \longrightarrow (5)$$
$$I R_s = I R_1 + I R_2 + I R_3$$
$$R_s = R_1 + R_2 + R_3 \longrightarrow (6)$$

i.e., $R_s = n R$



Series connection of resistors

- Consider three resistors R1, R2 and R3 are connected across two common points A and B.

$I_1 = V/R_1 \longrightarrow (1)$

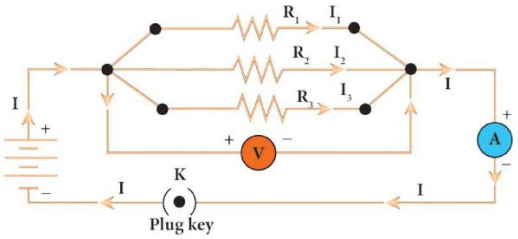
$I_2 = V/R_2 \longrightarrow (2)$

$I_3 = V/R_3 \longrightarrow (3)$

$I = I_1 + I_2 + I_3$

$I = V/R_1 + V/R_2 + V/R_3 \longrightarrow (4)$

$I = V/R_p \longrightarrow (5)$



Series connection of resistors

$V/R_p = V/R_1 + V/R_2 + V/R_3$

$1/R_p = 1/R_1 + 1/R_2 + 1/R_3$

i.e. $1/R_p = 1/R + 1/R + 1/R \ldots\ldots + 1/R = n/R$

Hence, $R_p = R/n$.

2. a) What is meant by electric current?

- Electric current is defined as the rate of flow of charges in a conductor. If Q is the charge flowing for a time of t seconds in a conductor, then I = Q/t

b) Name and define its unit.

- The SI unit of electric current is ampere (A).
- The current flowing through a conductor is said to be one ampere, when a charge of one coulomb flows across any cross-section of a conductor, in one second.
- Hence, 1 ampere = 1 coulomb/ 1 second.

c) Which instrument is used to measure the electric current? How should it be connected in a circuit?

- An ammeter is a device used to measure the electric current in a circuit.
- An ammeter is always connected in series with a device to measure its current.

3. a) State Joule's law of heating.

- Joule's law of heating states that the heat produced in any resistor is:
- Directly proportional to the square of the current passing through the resistor.
- Directly proportional to the resistance of the resistor.
- Directly proportional to the time for which the current is passing through the resistor.

b) An alloy of nickel and chromium is used as the heating element. Why?

- It has high resistivity,
- It has a high melting point
- It is not easily oxidized.

c) How does a fuse wire protect electrical appliances?

- The fuse wire is connected in series, in an electric circuit.
- When a large current passes through the circuit, the fuse wire melts due to Joule's heating effect and hence the circuit gets disconnected.

4. Explain about domestic electric circuits. (circuit diagram not required)

- The electricity produced in power stations is distributed to all the domestic and industrial consumers through overhead and underground cables.
- The domestic circuit is to bring the power supply to the main-box.
- Main box contains a fuse box and a meter.
- Meter – Used to record the consumption of Electricity.
- Fuse box – It protect the household electrical appliances.
- MCB – can be activated automatically as well as manually.
- Red insulation wire - live wire
- Black insulation wire - neutral wire
- Potential of domestic current is 220V.
- Electricity meter → Main switch with 5A rating → Appliances with 15A rating.
- Advantage of the parallel connection of circuits is that each electric appliance gets an equal voltage.

5. a) What are the advantages of LED TV over the normal TV?

- It has brighter picture quality.
- It is thinner in size.
- It uses less power and consumes very less energy.
- Its life span is more.

b) List the merits of LED bulb.

- It is not harmful to the environment.
- A wide range of colours is possible here.
- It is cost-efficient and energy efficient.
- Mercury and other toxic materials are not used in LED bulbs.

LESSON 5 ACOUSTICS

VI. Answer very briefly

1. What is a longitudinal wave?

- Sound waves are longitudinal waves that can travel through any medium (solids, liquids, gases) with a speed that depends on the properties of the medium.

2. What is the audible range of frequency?

- The audible range of frequency is 20 Hz and 20,000 Hz

3. What is the minimum distance needed for an echo?

- The minimum distance required to hear an echo is 17.2 m.

4. What will be the frequency sound having 0.20 m as its wavelength, when it travels with a speed of 331 ms^{-1}?

$\lambda = 0.20$ m ; V= 331 ms-1

$V = n\lambda$ $n = V/\lambda$

n = 331 ms-1 / 0.20 m = 331 / 0.20 = 1655 Hz.

5. Name three animals, which can hear ultrasonic vibrations.

- Bat, Mosquito, Dogs.

VII. Answer briefly

1. Why does sound travel faster on a rainy day than on a dry day?

- During rainy days, the moisture content is more in the atmosphere and speed or velocity of sound.

2. Why does an empty vessel produce more sound than a filled one?

- The sound is produced by the vibration of the vessel.
- More the vibration amplitude and frequency more is the noise.
- More is the pressure less is sound.

3. Air temperature in the Rajasthan desert can reach 46°C. What is the velocity of sound in air at that temperature? (V_0= 331 m s^{-1})

Speed of the sound wave as function of temperature is given by

$$V = (V_0)\ (\sqrt{1} + Tc/273)$$

Where T c is the temperature in º celcius.

So the speed of sound wave in air at 46ºc is given by

$$V = 331\ (\sqrt{1} + 46/273)$$

$$= 357.8 \text{ m/s.}$$

4. Explain why, the ceilings of concert halls are curved.

- When a person is talking at one focus, his voice can be heard distinctly at the other focus. It is due to the multiple reflections of sound waves from the curved walls.

5. Mention two cases in which there is no Doppler effect in sound?

- When source (S) and listener (L) both are at rest.
- When S and L move in such a way that distance between them remains constant

IX. Answer in Detail

1. What are the factors that affect the speed of sound in gases?

- **Effect of density:** The velocity of sound in a gas is inversely proportional to the square root of the density of the gas. Hence, the velocity decreases as the density of the gas increases. $v \alpha 1/\sqrt{d}$

Effect of temperature: The velocity of sound in a gas is directly proportional to the square root of its temperature.

- The velocity of sound in a gas increases with the increase in temperature. $v \alpha \sqrt{T}$.
- Velocity at temperature T is given by the following equation: $vT = (vo + 0.61\ T)$ m s–1 Here, vo is the velocity of sound in the gas at 0° C. For air, vo = 331 m s–1. Hence, the velocity of sound changes by 0.61 m s–1 when the temperature changes by one degree Celsius.

Effect of relative humidity: When humidity increases, the speed of sound increases. That is why you can hear sound from long distances clearly during rainy seasons.

2. What is mean by reflection of sound? Explain:

- When sound waves travel in a given medium and strike the surface of another medium, they can be bounced back into the first medium. This phenomenon is known as reflection.

a) Reflection at the boundary of a rarer medium

- Consider a wave travelling in a solid medium striking on the interface between the solid and air.
- The compression exerts a force F on the surface of the rarer medium.
- As a rarer medium has smaller resistance for any deformation, the surface of separation is pushed backwards.
- As the particles of the rarer medium are free to move, a rarefaction is produced at the interface.
- Thus, a compression is reflected as a rarefaction and a rarefaction travels from right to left.

b) Reflection at the boundary of a denser medium

- A longitudinal wave travels in a medium in the form of compressions and rarefactions.
- Suppose a compression travelling in air from left to right reaches a rigid wall.
- The compression exerts a force F on the rigid wall.

- In turn, the wall exerts an equal and opposite reaction R = – F on the air molecules.
- This results in a compression near the rigid wall.
- Thus, a compression travelling towards the rigid wall is reflected back as a compression. That is the direction of compression is reversed.

c) Reflection at curved surfaces

- When the sound waves are reflected from the curved surfaces, the intensity of the reflected waves is changed.
- When reflected from a convex surface, the reflected waves are diverged out and the intensity is decreased.
- When sound is reflected from a concave surface, the reflected waves are converged and focused at a point. So the intensity of reflected waves is concentrated at a point.

3. a) What do you understand by the term 'ultrasonic vibration'?

- The vibrations whose frequencies are greater than 20,000 Hz are called Ultrasonic Vibrations.

b) State three uses of ultrasonic vibrations.

- Used in SONAR to measure the depth of sea or ocean.
- Used to check the presence of stones in the gall bladder and kidney.
- It is used for homogenizing milk in milk plants

c) Name three animals which can hear ultrasonic vibrations.

- Bat, Mosquito, Dogs.

4. What is an echo?

- An echo is the sound reproduced due to the reflection of the original sound from various rigid surfaces such as walls, ceilings, surfaces of mountains, etc.

a) State two conditions necessary for hearing an echo.

- The minimum time gap between the original sound and an echo must be 0.1 s.
- The minimum distance required to hear an echo is 17.2 m.

b) What are the medical applications of echo?

- It is used in obstetric ultra sonography.
- It is used to create real-time visual images of the developing embryo or fetus in the mother's uterus.

c) How can you calculate the speed of sound using echo?

- Speed of Sound = distance travelled / time taken = 2d/t.

LESSON 6 NUCLEAR PHYSICS

IX. Answer in one or two word (VSA)

1. Who discovered natural radioactivity?

- Henri Becquerel.

2. Which radioactive material is present in the ore of pitchblende?

- Uranium.

3. Write any two elements which are used for inducing radioactivity?

- Boron, Aluminium.

4. Write the name of the electromagnetic radiation which is emitted during a natural radioactivity.

- Alpha – rays.

5. If A is a radioactive element which emits an α - particle and produces 104Rf 259. Write the atomic number and mass number of the element A.

- $_{106}Sg^{263}$ Atomic number of A = 106, Mass number of A = 263.

6. What is the average energy released from a single fission process?

- The average energy released in each fission process is about 3.2×10^{-11} J

7. Which hazardous radiation is the cause for the genetic disease?

- Gamma – rays.

8. What is the amount of radiation that may cause death of a person when exposed to it?

- When the body is exposed to about 600 R, it leads to death.

9. When and where was the first nuclear reactor built?

- The first nuclear reactor was built in 1942 at Chicago, USA.

10. Give the SI unit of radioactivity.

- Becquerel.

11. Which material protects us from radiation?

- Lead.

X. Answer the following questions in few sentences.

1. Write any three features of natural and artificial radioactivity.

Natural Radioactivity	Artificial Radioactivity
It is a spontaneous process.	It is an induced process
Exhibited by elements with atomic number more than 83.	Exhibited by elements with atomic number less than 83.
This cannot be controlled.	This can be controlled.
Radiations are emitted.	Elementary particles are emitted.

2. Define critical mass

- The minimum mass of a fissile material necessary to sustain the chain reaction is called 'critical mass (m_c)'.
- It depends on the nature, density and the size of the fissile material.

3. Define one roentgen.

- One roentgen is defined as the quantity of radioactive substance which produces a charge of 2.58 $\times 10^{-4}$ coulomb in 1 kg of air under standard conditions of pressure, temperature and Humidity.

4. State Soddy and Fajan's displacement law.

- When a radioactive element emits an alpha particle,
- a daughter nucleus is formed whose mass number is less by 4 units
- The atomic number is less by 2 units, than the mass number and atomic number of the parent nucleus.
- When a radioactive element emits a beta particle,
- A daughter nucleus is formed whose mass number is the same.
- The atomic number is more by 1 unit, than the atomic number of the parent nucleus.

5. Give the function of control rods in a nuclear reactor.

- They absorb the neutrons.
- Control rods are used to control the number of neutrons in order to have sustained chain reaction.
- Mostly boron or cadmium rods are used as control rods.

6. In Japan, some of the new born children are having congenital diseases. Why?

- Reason – Exploitation of atomic bomb during World War II.
- Hazardous radiation like gamma rays affects the leaving creature.

7. Mr. Ramu is working as an X - ray technician in a hospital. But, he does not wear the lead aprons. What suggestion will you give to Mr. Ramu?

My Suggestions:

- Use lead coated aprons and lead gloves.
- Avoid eating while handling radioactive elements.
- Use remote control device or tongs.
- Worn Dosimeter to check the level of radiation.

8. What is stellar energy?

- Fusion reaction that takes place in the cores of the Sun and other stars results in an enormous amount of energy, which is called as 'stellar energy.

9. Give any two uses of radio isotopes in the field of agriculture?

- Phosphorus- 32 and Nitrogen-15.

XI. Answer the following questions in detail.

1. Explain the process of controlled and uncontrolled chain reactions.

Controlled chain reaction:

- In the controlled chain reaction the number of neutrons released is maintained to be one.
- This is achieved by absorbing the extra neutrons with a neutron absorber leaving only one neutron to produce further fission.
- The energy released due to a controlled chain reaction can be utilized for constructive purposes.
- Controlled chain reaction is used in a nuclear reactor to produce energy in a sustained and controlled manner.

Uncontrolled chain reaction:

- In the uncontrolled chain reaction the number of neutrons multiplies indefinitely and causes fission in a large amount of the fissile material.
- This results in the release of a huge amount of energy within a fraction of a second.
- This kind of chain reaction is used in the atom bomb to produce an explosion.

2. Compare the properties of alpha, beta and gamma radiations.

Properties	Alpha	Beta	Gamma
What are they	Helium nucleus	Electrons	Electromagnetic waves
Charge	Positive	Negative	Neutral
Ionising power	100 times greater than beta rays. 10,000 times greater than gamma rays.	Comparatively low	Very less ionization power.
Penetrating power	Low	Greater than alpha rays	Very high penetrating power.
Effect of electric and magnetic field	Deflected by both the fields.	Deflected by both the fields. But opposite direction to alpha rays.	They are not deflected by both the fields.
Speed	1/10 to 1/20 times the speed of light.	9/10 times the speed of light.	They travel with the speed of light.

3. What is a nuclear reactor? Explain its essential parts with their functions.

- A Nuclear reactor is a device in which the nuclear fission reaction takes place in a self-sustained and controlled manner to produce electricity.
- The first nuclear reactor was built in 1942 at Chicago, USA.

Essential material:

- Fuel : Fissile material (E.g: Uranium)
- Moderator : Slow down the high energy neutrons to provide slow neutrons. (E.g: Graphite)
- Control rod : control the number of neutrons in order to have sustainable chain reaction
  - (E.g: Boron and cadmium).
- Coolant : To remove heat produced in the reactor core to produce steam.
  - (E.g: Water, air and helium)
- Protection wall: concrete lead wall to prevent the leakage of harmful Radiations.

UNIT 7 ATOMS AND MOLECULES

1. Define: Relative atomic mass.

$$(A_r) = \frac{\text{Average mass of the isotopes of the element}}{\frac{1}{12^{th}} \text{ of the mass of one Carbon-12 atom}}$$

2. Write the different types of isotopes of oxygen and its percentage abundance.

Isotope	Mass (amu)	% abundance
$_8O^{16}$	15.9949	99.757
$_8O^{17}$	16.9991	0.038
$_8O^{18}$	17.9992	0.205

3. Define: Atomicity.

- The number of atoms present in the molecule is called its Atomicity. E.g: Hydrogen.

4. Give any two examples for heterodiatomic molecules.

- CH, OH, NH.

5. What is Molar volume of a gas?

- One mole of any gas occupies 22.4 litre or 22400 ml at STP.
- The volume occupied by one mole of any gas at S.T.P is called molar volume.

6. Find the percentage of nitrogen in ammonia.

Molar mass of Ammonia = 14 + 3 = 17 g.

% of Nitrogen = $\frac{14}{17} \times 100$ = 82.35%.

VII. Long answer questions

1. Calculate the number of water molecule present in one drop of water which weighs 0.18 g.

Given Mass = 0.18 g
Avogadro Number = 6.023 × 1023
Molecular Mass of water = 18 g (H2O = 2(1) + 1(16) = 2 + 16 = 18)

$$\text{No. of water molecules} = \frac{\text{Avogadro number} \times \text{given man}}{\text{Molecular Mass of water}}$$

$$= \frac{6.023\times10^{23}\times0.18\,\cancel{g}}{18\,\cancel{g}}$$

$$= \frac{6.023\times10^{23}\times0.18\times100}{18\times10^{2}}$$

$$= \frac{6.023\times10^{23}\times18}{18\times10^{2}}$$

$$= \frac{6.023\times10^{23}\times10^{-2}\times\cancel{18}}{\cancel{18}}$$

$$= 6.023 \times 10^{23} \times 10^{-2}$$

$$= 6.023 \times 10^{21} \text{ molecules of water.}$$

2. $N_2 + 3H_2 \rightarrow 2NH_3$.
(The atomic mass of nitrogen is 14, and that of hydrogen is 1)
1 mole of nitrogen (_____g) +
3 moles of hydrogen (_____ g) →
2 moles of ammonia (_____ g)
1 mole of nitrogen (**28** g) +
3 moles of hydrogen (**3×1** g) →
2 moles of Ammonia (**34** g)
28, 3, 34

3. Calculate the number of moles in
i) 27g of Al ii) 1.51×10^{23} molecules of NH_4Cl.

i) $$\text{No. of moles} = \frac{\text{Mass}}{\text{Atomic Mass}}$$

$$= \frac{27g}{27g}$$

$$= 1 \text{ mole.}$$

ii) No. of moles $= \frac{\text{No. of molecules of } NH_4Cl}{\text{Avogadro's number}}$

$= \frac{1.51 \times 10^{23}}{6.023 \times 10^{23}}$

$= \frac{1}{4}$

$= 0.25$ mole.

4. Give the salient features of "Modern atomic theory".

Modern Atomic Theory:

- An atom is no longer indivisible (after the discovery of the electron, proton and neutron).
- Atoms of the same element may have different atomic mass (discovery of Isotopes $_{17}Cl^{35}$, $_{17}Cl^{37}$).
- Atoms of different elements may have same atomic masses (discovery of Isobars $_{20}Ar^{40}$, $_{20}Ca^{40}$).
- Atoms of one element can be transmuted into atoms of other elements. In otherwords, atom is no longer indestructible (discovery of artificial transmutation).
- Atoms may not always combine in a simple whole number ratio (Eg. Glucose $C_6H_{12}O_6$ C:H:O = 6:12:6 or 1:2:1 and Sucrose $C_{12}H_{22}O_{11}$ C:H:O = 12:22:11).
- Atom is the smallest particle that take part in a chemical reaction.
- The mass of an atom can be converted into energy ($E = mc^2$).

5. Derive the relationship between Relative molecular mass and Vapour density.

Relative Molecular Mass

- The ratio of Mass of one molecule of gas or vapour to the mass of one atom of hydrogen.

$$\text{Relative Molecular Mass} = \frac{\text{Mass of one molecule of gas or vapour}}{\text{Mass of one atom of hydrogen}} \quad \text{.....(1)}$$

- **Vapour density :** The ratio of mass of a certain volume of a gas or vapour to the mass of an equal volume of hydrogen, measured under the same conditions of temperature and pressure.

$$\text{Vapour Density} = \frac{\text{Mass of 1 volume of gas or vapour}}{\text{Mass of 1 volume of hydrogen}} \quad \text{.....(2)}$$

$$\text{VD} = \frac{\text{Mass of 1 volume of gas or vapour}}{\text{Mass of 1 volume of hydrogen}} \quad \text{.....(3)}$$

Applying Avogadro's law,

$$\text{VD} = \frac{\text{Mass of 1 molecule of gas or vapour}}{\text{Mass of 1 molecule of hydrogen}} \quad \text{.....(4)}$$

Hence hydrogen is diatomic

$$\text{VD} = \frac{\text{Mass of 1 molecule of gas or vapour}}{\text{Mass of 2 } \times \text{ atoms of hydrogen}} \quad \text{.....(5)}$$

$$\text{VD} = \frac{\text{Mass of 1 molecule of gas or vapour}}{2 \times \text{mass of 1 atom of hydrogen}} \quad \text{.....(6)}$$

Multiplying '2' on both sides

$$2 \times \text{VD} = \frac{\cancel{2} \times \text{Mass of 1 molecule of gas or vapour}}{\cancel{2} \times \text{Mass of 1 atom of hydrogen}} \quad \text{.....(7)}$$

$$2 \times \text{VD} = \frac{\text{Mass of 1 molecule of gas or vapour}}{\text{Mass of 1 atom of hydrogen}} \quad \text{.....(8)}$$

$$2 \times \text{VD} = \text{Relative Molecular Mass} \quad \text{.....(9)}$$

$$\text{VD} = \frac{\text{RMM}}{2} \text{ or } \frac{\text{Molecular Weight}}{2} \quad \text{.....(10)}$$

IX. Book Exercise – Solve the following problems

1. How many grams are there in the following?

i) 2 moles of hydrogen molecule, H_2.

Mass = No. of moles × Molecular Mass.

Mass = 2 × (2×1)

= 4 g.

ii) 3 moles of chlorine molecule, Cl_2.

Mass = No. of moles × Molecular Mass.

Mass = (35.5×2) × 3

= 71 × 3

= 213 g.

iii) 5 moles of sulphur molecule, S_8.

Mass = No. of moles × Molecular Mass.

Mass = (8×32) × 5

= 256 × 5 = 1280 g.

iv) 4 moles of phosphorous molecule, P_4.

Mass = No. of moles × Molecular Mass.

Mass = (4 × 31) × 4

= 124 × 4

= 496 g.

2. Calculate the % of each element in calcium carbonate. (Atomic mass: C-12, O-16, Ca -40).

$CaCO_3$.

Molar Mass of $CaCO_3$ = 1 (Ca) + 1 (C) + 3 (O)

= 1 (40) + 1 (12) + 3 (16)

= 40 + 12 + 48

= 100 g.

% of Ca in $CaCO_3$ $= \frac{\text{Mass of Ca}}{\text{Molar Mass of } CaCO_3} \times 100$

$= \frac{40\ \cancel{g}}{\cancel{100}\ \cancel{g}} \times \cancel{100}$

= 40%.

% of C in $CaCO_3$ $= \frac{\text{Mass of Carbon}}{\text{Molar Mass of } CaCO_3} \times 100$

$= \frac{12\ \cancel{g}}{\cancel{100}\ \cancel{g}} \times \cancel{100}$

= 12%.

% of O in $CaCO_3$ $= \frac{\text{Mass of Oxygen}}{\text{Molar Mass of Calcium}} \times 100$

$= \frac{48\ \cancel{g}}{\cancel{100}\ \cancel{g}} \times \cancel{100}$

= 48%.

3. Calculate the % of oxygen in $Al_2(SO_4)_3$. (Atomic mass: Al-12, O-16, S -32)

$Al_2(SO_4)_3$.

Molar Mass of $Al_2(SO_4)_3$ = 2 (Al) + 3 (S) + 12 (O)

= 2 (27) + 3 (32) + 12 (16)

= 54 + 96 + 192

= 342 g.

% of Oxygen in $Al_2(SO_4)_3$

% of Oxygen $= \frac{\text{Mass of Oxygen}}{\text{Molecular Mass of } Al_2(SO_4)_3}$

$= \frac{192\ \cancel{g}}{342\ \cancel{g}} \times 100$

= 56.14%.

4. Calculate the % relative abundance of B -10 and B -11, if its average atomic mass is 10.804 amu.

B10 and B11.

Let B10 = X%

B11 = (100 – X)%

$$\text{Average atomic mass} = 10X + \frac{11(100-x)}{100} = 10.80$$

$10X + 11(100–X) = 10.80 \times 100$

$10X + 1100 – 11X = 1080$

$1100 – X = 1080$

$– X = 1080 – 1100$

$– X = – 20$

$X = 20$

B10 = 20%.
B11 = (100–X) = 80%.

ADDITIONAL QUESTIONS:

1. State Avogadro's law.

- The Avogadro's law states that "equal volumes of all gases under similar conditions of temperature and pressure contain equal number of molecules"

2. Write the applications of Avogadro's law.

- It explains Gay-Lussac's law.
- It helps in the determination of atomicity of gases.
- Molecular formula of gases can be derived using Avogadro's law.
- It helps to determine gram molar volume of all gases (i.e, 22.4 litre at S.T.P).

3. Differentiate Atoms and Molecule.

Atoms	Molecule
An atom is the smallest particle of an element	A molecule is the smallest particle of an element or compound.
Atom does not exist in free state except in a noble gas	Molecule exists in free a state
Except some of noble gas, other atoms are highly reactive	Molecules are less reactive
Atom does not have a chemical bond	Atoms in a molecule are held by chemical bonds

LESSON 8 PERIODIC CLASSIFICATIONS OF ELEMENTS

VI. Short answer questions

1. A is a reddish brown metal, which combines with O_2 at < 1370 K gives B, a black coloured compound. At a temperature > 1370 K, A gives C which is red in colour. Find A,B and C with reaction.

- The reddish brown metal 'A' is copper.

On heating at different temperatures in the presence of oxygen, copper forms two types of oxides CuO,Cu_2O.

$$2\,Cu + O_2 \xrightarrow{\text{below 1370K}} 2\,CuO$$

(copper II oxide- black)

$$4\,Cu + O_2 \xrightarrow{\text{above 1370K}} 2\,Cu_2O$$

(copper I oxide – red)

Compound	Molecular formula	Name
A	Cu	Copper
B	CuO	Copper (ii) oxide
C	Cu_2O	Copper (i) oxide

2. A is a silvery white metal. A combines with O_2 to form B at 800° C, the alloy of A is used in making the aircraft. Find A and B

- The silvery white metal. A is Aluminium.

$$4Al + 3O_2 \xrightarrow{800°C} 2Al_2O_3 \text{ (Aluminium Oxide) (B)}$$

Compound	Molecular formula	Name
A	Al	Aluminium
B	Al_2O_3	Aluminium oxide

3. What is rust? Give the equation for formation of rust.

- When iron is exposed to moist air, it forms a layer of brown hydrated ferric oxide on its surface. This compound is known as rust and the phenomenon of formation of rust is known as rusting.

$$4Fe + 3O_2 + xH_2O \longrightarrow 2Fe_2O_3.xH_2O \text{ (Rust)}$$

4. State two conditions necessary for rusting of iron.

- Air, water and Moisture are necessary for rusting of iron.

VII. Long answer questions

1. a) State the reason for addition of caustic alkali to bauxite ore during purification of bauxite.

- Because Bauxite ore is finely ground and heated under pressure with a solution of concentrated caustic soda at 150°C to obtain Sodium meta aluminate.
- On diluting sodium meta aluminate with water, a precipetate of aluminium hydroxide is formed.
- This precipitate is filtered, washed, dried and ignited at 1000°C to get alumina.

$$2Al(OH)_3 \xrightarrow{1000^\circ c} Al_2O_3 + 3H_2O$$

b) Along with cryolite and alumina, another substance is added to the electrolyte mixture. Name the substance and give one reason for the addition.

- Fluorspar. (It lowers the fusion temperature of electrolyte)

2. The electronic configuration of metal A is 2, 8, 18, 1. The metal A when exposed to air and moisture forms B a green layered compound. A with con. H_2SO_4 forms C and D along with water. D is a gaseous compound. Find A,B,C and D.

i) Metal A is copper.

ii) Action of Air and Moisture: Copper gets covered with agreen layer of Basic Copper Carbonate in the presence of CO_2 and moisture.

$$\underset{\text{(A) copper}}{2\,Cu} + O_2 + CO_2 + H_2O \longrightarrow \underset{\text{Basic copper carbonate (Malachite green) B}}{CuCO_3.Cu(OH)_2}$$

iii) Copper is react with Conc.H_2SO_4 to form copper sulphate and sulphur dioxide.

$$Cu + 2H_2SO_4 \longrightarrow \underset{\text{Copper Sulphate (C)}}{CuSO_4} + \underset{\text{Sulphur dioxide (D)}}{SO_2\uparrow} + 2H_2O$$

compound	molecular formula	name
A	Cu	copper
B	$CuCO_3.Cu(OH)_2$	malachite green
C	$CuSO_4$	copper sulphate
D	SO_2	sulphurdioxide

3. Explain smelting process.

Smelting is the process of reducing the roasted metallic oxide from the metal in its molten condition. In this process, impurities are removed as slag by the addition of flux.

(a) The Lower Region (Combustion Zone)-

- The temperature is at 1500°C.

$$C + O_2 \xrightarrow[\Delta]{1500°C} CO_2 + \text{Heat}$$

(b) The Middle Region (Fusion Zone) –

- The temperature prevails at 1000°C.

$$CO_2 + C \xrightarrow[\Delta]{1000°C} 2\,CO - \text{Heat}$$

$$CaCO_3 \xrightarrow[\Delta]{} CO_2 - \text{Heat}$$

(c) The Upper Region (Reduction Zone)-

- The temperature prevails at 400°C .

$$Fe_2O_3 + 3CO \xrightarrow{400°C} 2Fe + 3CO_2$$

1. Metal A belongs to period 3 and group 13. A in red hot condition reacts with steam to form B. A with strong alkali forms C. Find A,B and C with reactions.

i) The metal A is Aluminium.

ii) When steam is passed over red hot aluminium, hydrogen only produced.

$$2Al + 3H_2O \longrightarrow \underset{(B)}{Al_2O_3} + 3H_2\uparrow$$

B ⟶ Aluminium Oxide

iii) It reacts with strong caustic alkalis forming aluminates.

$$2Al + 2NaOH + 2H_2O \longrightarrow \underset{(C)}{2NaAlO_2} + 3H_2\uparrow$$

C ⟶ Sodium meta Aluminate

Compound	Molecular formula	Name
A	Al	Aluminium
B	Al_2O_3	Aluminium Oxide
C	$NaAlO_2$	Sodium meta aluminate

2. Name the acid that renders aluminium passive. Why?

- Conc. Nitric Acid (Conc.HNO_3). Concentrated and dil Nitric acid does not attack aluminium, but it renders aluminum passive due to the formation of an oxide film on its surface.

3. i) Identify the bond between H and F in HF molecule.

- Ionic.

ii) What property forms the basis of identification?

- Electronegativity.

iii) How does the property vary in periods and in groups?

- Along the period from left to right in the periodic table, the electronegativity increases because of the increase in nuclear charge which in turn attracts the electrons more strongly.
- On moving down a group, the electronegativity of the elements decreases because of the increased number of energy levels.

ADDITIONAL QUESTIONS:

1. Write down the physical properties of metals?

- High melting point.
- High density.
- Good Conductors of heat and electricity.

2. Write down the chemical properties of metals?

- Metals are electropositive.
- Monoatomic.
- Usually having 1,2 or 3 electrons.

3. What are alloys?

- An alloy is a homogenous mixture of one or more metals.
- One or more metals with non metals.

4. Define Amalgam.

- An amalgam is an alloy of mercury with another metal.
- Amalgam used in dental filling.

5. What are the types of alloys?

- Ferrous amalgam - It contains Iron (Fe)
- Non ferrous amalgam - Do not contain Iron (Fe)

6. Define Corrosion.

- It is the gradual destruction of metals by chemical or electrochemical reaction with the environment.
- It is a natural process. Which Conversion of metal into oxides, hydroxides or sulphides.

7. Explain the preventive measures of corrosion?

- **Alloying:** The metals can be alloyed to prevent the process of corrosion. eg: Stainless Steel.
- **Galvanization:** It is a method of coating one metal over another metal by passing electric current.
- **Electroplating:** It is a method of coating one metal over another metal by passing electric current.

LESSON 9 SOLUTIONS

V. Short answer

1. Define the term: Solution

- Solution is a homogeneous mixture of two or more substances.

2. What is mean by binary solution

- A solution contains two components is called Binary solution. Eg. Salt in water, Sugar in water.

3. Give an example each i) gas in liquid ii) solid in liquid iii) solid in solid iv) gas in gas

- Gas in liquid. Soda water.
- Solid in liquid. Sodium chloride in water.
- Solid in solid. Copper dissolved in Gold (alloys).
- Gas in gas. Mixture of He – O_2 gases.

4. What is aqueous and non-aqueous solution? Give an example.

- **Aqueous solution:** The solution in which water acts as a solvent is called aqueous solution. eg: Common salt in water, sugar in water.
- **Non–aqueous solution:** The solution in which any liquid other than water, acts as a solvent is called non–aqueous solution. eg: Sulphur dissolved in carbon di sulphide, iodine dissolved in Ccl_4.

5. Define Volume percentage

- Volume percentage is defined as the percentage by volume of solute present in the given volume of the solution.

$$\text{Volume percentage} = \frac{\text{Volume of the solute}}{\text{Volume of the solute + Volume of the solvent}} \text{ X } 100$$

$$\text{Volume percentage} = \frac{\text{Volume of the solute}}{\text{Volume of the solution}} \text{ X } 100$$

6. The aquatic animals live more in cold region Why?

- Because, more amount of dissolved oxygen is present in the water of cold regions. This shows that the solubility of oxygen in water is more at low temperature.

7. Define Hydrated salt.

- The number of water molecules found in the crystalline substance is called water of crystallisation. Such salts are called hydrated salts.

8. A hot saturated solution of copper sulphate forms crystals as it cools. Why?

- The number of water molecules in blue vitriol is five, so its water of crystallisation is 5.
- When blue coloured copper sulphate crystals are gently heated, it loses its 5 water molecules and becomes anhydrous copper sulphate.
- Then add a few drops of water or allow it to cool, the colourless anhydrous salt again turns back into blue coloured hydrated salt.

9. Classify the following substances into deliquescent, hygroscopic. Conc. Sulphuric acid, Copper sulphate penta hydrate, Silica gel, Calcium chloride, and Gypsum salt.

Deliquescent	Hygroscopic
Calcium Chloride	Conc. Sulphuric acid
	Copper sulphate penta hydrate
	Silica gel
	Gypsum salt

VI. Long answer:

1. Write notes on i) saturated solution ii) unsaturated solution

Saturated solution	Unsaturated solution
A solution in which no more solute can be dissolved in a definite amount of the solvent at a given temperature is called saturated solution.	A solution is one that contains less solute than that of the saturated solution at a given temperature.
eg: 36 g of sodium chloride in 100 g of water at 25° C.	eg: 10 g (or) 20 g (or) 30 g of sodium chloride in 100 g of water at 25° C form unsaturated solution.

2. Write notes on various factors affecting solubility.

Factors affecting solubility: There are three main factors which govern the solubility of solute. They are;

i) Nature of the solute and solvent.

ii) Temperature.

iii) Pressure.

Nature of the solute and solvent:

- The nature of the solute and solvent plays an important role in solubility. Although water dissoves an enormous variety of substances, both ionic and covalent, it does not dissove everything. For example: Fat dissolved in Ether.

Effect of temperature :

- Solubility of a soled solute in a liquid solvent increases with increase in temperature.
- In endothermic Process: Solubility increases with increase in temperature.
- In exothermic Process: Solubility decreases with increase in temperature.

Solubility of gases in liquid:

- Solubility of gases in liquid decrease with increase in temperature.
- Generally water contains dissolved oxygen. When water is boiled the solubility of oxygen in water decreases. So oxygen escapes in the form of bubbles.

Effect of pressure:

- When the pressure is increased, the solubility of a gas in liquid increases. Eg.: Carbonated beverage.

3. a) What happens when MgSO4 . 7H2 O is heated? Write the appropriate equation b) Define solubility.

- Its water of crystallisation is 7. When magnesium sulphate hepta hydrate crystals are genetly heated, it loses seven water molecules and becomes an hydrous magnesium sulphate.

$$MgSO_4.7H_2O \underset{\text{Cooling}}{\overset{\text{Heating}}{\rightleftharpoons}} MgSO_4 + 7H_2O$$

(Magnesium sulphate heptahydrate) (Anhydrous Magnesium sulphate)

- Solubility is defined as the number of grams of solute that can be dissolved in 100 g of a solvent to form its saturated solution at a given temperature and pressure.

$$\text{Solubility} = \frac{\text{Mass of the solute}}{\text{Mass of the solvent}} \text{ X } 100$$

4. In what way hygroscopic substances differ from deliquescent substances.

Hygroscopic substances	Deliquescent substances
When exposed to the atmosphere at ordinary temperature, they absorb moisture and do not dissolve.	When exposed to the atmospheric air at ordinary temperature, they absorb moisture and dissolve.
Hygroscopic substances do not change its physical state on exposure to air	Deliquescent substances change its physical state on exposure to air
Hygroscopic substances may be amorphous solids or liquids.	Deliquescent substances are crystalline solids.

5. A solution is prepared by dissolving 45 g of sugar in 180 g of water. Calculate the mass percentage of solute.

Given : Mass of the solute = 45 g
Mass of the solvent = 180g

$$\text{Mass Percentage} = \frac{\text{Mass of the solute}}{\text{Mass of the solute + Mass of the solvent}} \times 100$$

$$= \frac{45g}{45g+180g} \times 100$$

$$= \frac{45}{225} \times 100$$

$$= 20\%.$$

6. 3.5 litres of ethanol is present in 15 litres of aqueous solution of ethanol. Calculate volume percent of ethanol solution.

Given : Volume of the solute = 3.5 litof ethanol.
Volume of the solution = 15 lit.

$$\text{Volume Percentage} = \frac{\text{Volume of the solute}}{\text{Volume of the solution}} \times 100$$

$$= \frac{3.5 \cancel{lit}}{15 \cancel{lit}} \times 100$$

$$= \frac{0.7 \cancel{3.5}}{3 \cancel{15}} \times 100$$

$$= \frac{70}{3}$$

$$\text{Volume Percentage} = 23.33\%.$$

LESSON 10 TYPES OF CHEMICAL REACTION

V. Short Answer questions:

1. When an aqueous solution of potassium chloride is added to an aqueous solution of silver nitrate, a white precipitate is formed. Give the chemical equation of this reaction.

$$KCl + AgNO_3 \rightarrow AgCl \downarrow + KNO_3.$$

2. Why does the reaction rate of a reaction increase on raising the temperature?

- Most of the reactions go faster at higher temperature.
- Because adding heat to the reactants provides energy to break more bonds and thus speed up the reaction.

3. Define combination reaction. Give one example for an exothermic combination reaction.

- A combination reaction is a reaction in which two or more reactants combine to forms a compound.
- Most of the combination reactions are exothermic reactions.

4. Differentiate reversible and irreversible reactions

REVERSIBLE REACTION	IRREVERSIBLE REACTION
It can be reversed under suitable conditions	It cannot be reversed.
Both forward and backward reactions take place simultaneously.	It is unidirectional. It proceeds only in forward direction.
It attains equilibrium.	Equilibrium is not attained.
The reactants cannot be converted completely into products	The reactants can be completely converted into products
It is relatively slow	It is fast

VI. Answer in detail

1. What are called thermolysis reactions?

- The molecule is dissociated by the absorption of heat. It is otherwise called 'Thermolysis'.
- **Example - 1:** When mercuric oxide is decomposed into mercury metal and oxygen gas.

$$2HgO_{(s)} \xrightarrow{Heat} 2Hg_{(l)} + O_{2(g)}$$

- **Example - 2:** When calcium carbonate is decomposed into calcium oxide and carbon di oxide.

$$CaCO_{3(s)} \xrightarrow{Heat} CaO_{(s)} + CO_{2(g)}$$

- In thermal reaction heat is applied to break bonds. In which heat is absorbed are called Endothermic.

2. Explain the types of double displacement reactions with examples.

- When two components react, if their ions are interchanged, then the reaction is called double displacement reaction.
- There are two different types of double displacement reactions.

Precipitation reaction:

- When a two compound of aqueous solutions are mixed, if they forms an insoluble and soluble components is called precipitation reaction.
- **Example:** When aqueous solution of potassium iodide is reacts with lead it forms a yellow precipitate of lead.

$$Pb(NO_3)_{2(aq)} + 2KI_{(aq)} \rightarrow PbI_{2(s)}\downarrow + 2KNO_{3(aq)}$$

Neutralisation reaction:

- When acid reacts with base it forms salt and water. It is called neutralization.
- **Example -1:** Reaction of Sodium hydroxide and hydrochloride acid.

$$HCl_{(aq)} + NaOH_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$$

- **Example -2:** Reaction of ammonium hydroxide with nitric acid.

$$HNO_{3(aq)} + NH_4OH_{(aq)} \rightarrow NH_4NO_{3(aq)} + H_2O_{(l)}$$

3. Explain the factors influencing the rate of a reaction.

Important factors that affect rate of reaction are; i) Nature of the reactants. ii) Concentration of the reactants. iii) Temperture. iv) Catalyst. v) Pressure. vi) Surface area of the reactants.

Nature of the Reactants:

- The reaction of sodium with hydrochloric acid is faster than that with acetic acid. Because, Hydrochloric acid is a stronger acid than acetic acid and thus more reactive. So, the nature of the reactants influences the reaction rate.

$$2Na_{(s)} + 2HCl_{(aq)} \rightarrow 2NaCl_{(aq)} + H_{2(g)} \text{ (fast)}$$
$$2Na_{(s)} + 2CH_3COOH_{(aq)} \rightarrow 2CH_3COONa_{(aq)} + H_{2(g)} \text{ (slow)}$$

Concentration of the Reactants:

- Changing the amount of the reactants also increases the reaction rate. The amount of the substance present in a certain volume of the solution is called 'concentration'.
- More the concentration, more particles per volume exist in it and hence faster the reactions. Granulated zinc reacts faster with 2M hydrochloric acid than 1M hydrochloric acid.

Temperature:

- Most of the reactions go faster at higher temperature. Because adding heat to the reactants provides energy to break more bonds and thus speed up the reaction.
- Calcium carbonate reacts slowly with hydrochloric acid at room temperature. When the reaction mixture is heated the reaction rate increases.

Pressure:

- If the reactants are gases, increasing their pressure increases the reaction rate.
- This is because, on increasing the pressure the reacting particles come closer and collide frequently.

Catalyst:

- A catalyst is a substance which increases the reaction rate without being consumed in the reaction. In certain reactions, adding a substance as catalyst speeds up the reaction.
- For example, on heating potassium chlorate, it decomposes into potassium chloride and oxygen gas, but at a slower rate. If manganese dioxide is added, it increases the reaction rate. (Here, MnO2 act as a catalyst)

$$2KClO_3 \xrightarrow{MnO_2} 2KCl + 3O_2$$

Surface Area of the Reactants:

- When solid reactants are involve in a reaction, their powdered form reacts more readily.
- For example, powdered calcium carbonate reacts more readily with hydrochloric acid than marble chips. Because, powdering of the reactants increases the surface area and more energy is available on collision of the reactant particles. Thus, the reaction rate is increased.

4. How does pH play an important role in everyday life?

- Living organisms can survive only in a narrow range of pH change. Different body fluids have different pH values.
- **pH of blood is ranging from 7.35 to 7.45.** Any increase or decrease in this value leads to diseases. The ideal pH for blood is 7.4.
- It helps in the digestion of food without harming the stomach. **pH of the stomach fluid is approximately 2.0**. pH of the saliva normally ranges between 6.5 to 7.5.
- When the pH of the mouth saliva falls below 5.5, the enamel gets weathered.
- **The pH of rain water is approximately 7**, which means that it is neutral and also represents its high purity. If the pH of rain water is less than 7, then it is called acid rain.
- In agriculture, the pH of soil is very important. It depends upon the nature and the range of different soil, different crops are cultivated.

5. What is a chemical equilibrium? What are its characteristics?

Chemical Equilibrium:

- It is state of a reversible chemical reaction in which no change in the amount of the reactants and products takes place.
- At equilibrium, Rate of Forward reaction = Rate of Backward reaction

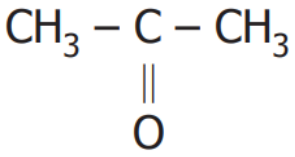
Characteristics of Equilibrium:

- In a chemical equilibrium, the rates of the forward and backward reactions are equal.
- The observable properties such as pressure, concentration, colour, density, viscosity etc., of the system remain unchanged with time.
- The chemical equilibrium is a dynamic equilibrium, because both the forward and backward reactions continue to occur even though it appears static externally.
- In physical equilibrium, the volume of all the phases remain constant.

LESSON 11 CARBON AND ITS COMPOUND

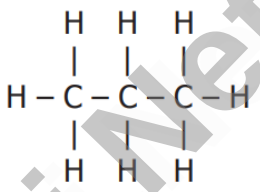
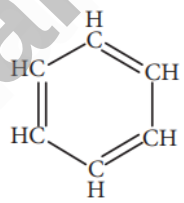
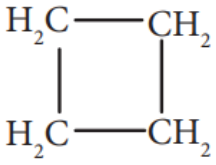
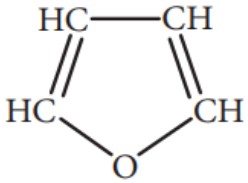
V. Short answer questions

1. Name the simplest ketone and give its structural formula.



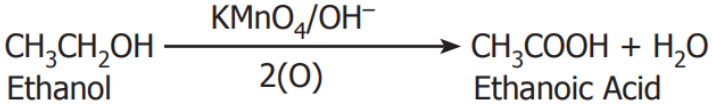
- Acetone.

2. Classify the following compounds based on the pattern of carbon chain and give their structural formula: (i) Propane (ii) Benzene (iii) Cyclobutane (iv) Furan

S.no	Compound	Formula	Structural formula
1	Propane	$CH_3 - CH_2 - CH_3$.	
2	Benzene	$C_6 H_6$.	
3	Cyclobutane	$C_4 H_8$.	
4	Furan	$C_4 H_4 O$.	

3. How is ethanoic acid prepared from ethanol? Give the chemical equation.

- Ethanoic acid is prepared in large scale, by the oxidation of ethanol in the presence of alkaline potassium permanganate or acidified potassium dichromate.



4. How do detergents cause water pollution? Suggest remedial measures to prevent this pollution?

- Detergents also add another problem for aquatic life by lowering the surface tension of the water.
- Phosphates in detergents can lead to fresh water algal blooms that releases toxins and deplete oxygen in waterways.
- When the algae decompose, they use up the oxygen available for aquatic life.

Remedial Measures :

- Immediate reduction and evetual eradication of phosphates in detergents.
- Awareness among consumers to select washing products with the least amount of polluting ingredients.

5. Differentiate soaps and detergents.

Soap	Detergent
It is a sodium salt of long chain fatty acids.	It is sodium salts of sulphonic acids.
It is prepared from animal fats or vegetable oils.	It is prepared from hydrocarbons obtained from crude oil.
Soaps are biodegradable.	Most of the detergents are non-biodegradable.

VI. Long answer questions

1. What is called homologous series? Give any three of its characteristics?

- Homologous series : is a group or a class of organic compounds having same general formula and similar chemical properties in which the successive members differ by a - CH_2 group.

General characteristics:

- All members of a homologous series contain the same elements and functional group.
- They are represented by a general molecular formula. e.g. Alkanes, CnH2n + 2.
- Chemical properties of the members of a homologous series are similar.
- All the members can be prepared by a common method.

2. Arrive at, systematically, the IUPAC name of the compound: $CH_3 – CH_2 – CH_2 –OH$.

- Step 1 - It contains 3 carbon atoms (Prop).
- Step 2 - It contains single bond (ane).
- Step 3 - It contains alcohol group –OH (al)
- IUPAC of the given formula is **(propanol).**

3. How is ethanol manufactured from sugarcane?

- Molasses is a dark coloured syrup liquid after the crystallization of sugar from concentrated sugarcane juice.
- It contains 30% of sucrose, which cannot be separated by crystallization.

Dilution of Molasses :

- Molasses is first diluted with water to bring down the concentration of sugar to about 8 to 10 percent..

Addition of Nitrogen source :

- Molasses usually contains enough nitrogenous matter to act as food for yeast during the fermentation process.
- If the nitrogen content of the molasses is poor, it may be fortified by the addition of ammonium sulphate or ammonium phosphate.

Addition of Yeast :

- The solution obtained in step (ii) is collected in large 'fermentation tanks' and yeast is added to it.
- The mixture is kept at about 303K for a few days. During this period, the enzymes invertase and zymase present in yeast, bring about the conversion of sucrose into ethanol.

$$\underset{\text{Sugar}}{C_{12}H_{22}O_{11}} + H_2O \xrightarrow{\text{invertase}} \underset{\text{glucose}}{C_6H_{12}O_6} + \underset{\text{fructose}}{C_6H_{12}O_6}$$

$$\underset{\text{glucose or fuctose}}{C_6H_{12}O_6} \xrightarrow{\text{zymase}} \underset{\text{ethanol}}{2C_2H_5OH} + 2\,CO_2$$

Distillation of 'Wash' :

- The fermented liquid (i.e. wash), containing 15 to 18 percent alcohol, is now subjected to fractional distillation.
- The main fraction drawn is an aqueous solution of ethanol which contains 95.5% of ethanol and 4.5% of water. This is called rectified spirit.
- This mixture is then refluxed over quicklime for about 5 to 6 hours and then allowed to stand for 12 hours.
- On distillation of this mixture, pure alcohol (100%) is obtained. This is called absolute alcohol.

4. Give the balanced chemical equation of the following reactions:

(i) Neutralization of NaOH with ethanoic acid.

$$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$$

(ii) Evolution of carbon dioxide by the action of ethanoic acid with $NaHCO_3$.

$$CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + CO_2 \uparrow + H_2O$$

(iii) Oxidation of ethanol by acidified potassium dichromate.

$$\underset{\text{Ethyl alcohol}}{CH_3CH_2OH} \xrightarrow[2(O)]{K_2Cr_2O_7 / H^+} \underset{\text{Acetic acid}}{CH_3COOH} + H_2O$$

(iv) Combustion of ethanol.

$$\underset{\text{Ethanol}}{C_2H_5OH} + 3O_2 \rightarrow \underset{\text{Carbon dioxide}}{2CO_2} + 3H_2O$$

5. Explain the mechanism of cleansing action of soap.

- A Soap molecule contains two chemically distinct parts that interact differently with water.
- It has one polar end, which is a short head with a carboxylate group (–COONa) and one non–polar end having the long tail made of the hydrocarbon chain.
- The polar end is hydrophilic (water loving) in nature and this end is attracted towards water.
- The non– polar end is hydrophobic (water hating) in nature and it is attracted towards oil and dirt.
- When a soap (or) detergent is dissolved in water, the molecules join together as clusters called micelles.
- The changed carboxylate end of the soap molecules makes the micelles soluble in water. Thus. the dirt is washed away with the soap.

LESSON 12 PLANT ANATOMY AND PLANT PHYSIOLOGY

V. Answer in a sentence:

1. What is collateral vascular bundle?

- Vascular bundle in which xylem lies towards the centre and phloem lies towards the periphery is called as collateral vascular bundle.

2. Where does the carbon that is used in photosynthesis come from?

- Atmosphere

3. What is the common step in aerobic and anaerobic pathway?

- Glycolysis.

4. Name the phenomenon by which carbohydrates are oxidized to release ethyl alcohol.

- Anaerobic respiration or fermentation

VI. Short answer questions

1. Give an account on vascular bundle of dicot stem.

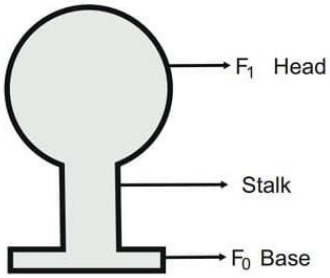
- Vascular bundles are conjoint, collateral, endarch and open.
- They are arranged in the form of a ring around the pith.

2. Write a short note on mesophyll.

- The tissue present between the upper and lower epidermis is called mesophyll. It is differentiated into Palisade parenchyma and Spongy parenchyma.

3. Draw and label the structure of oxysomes.

Ans:-



4. Name the three basic tissues system in flowering plants.

- Dermal or Epidermal tissue system
- Ground tissue system
- Vascular tissue system

5. What is photosynthesis and where in a cell does it occur?

- Plants prepare their own food with the help of sunlight and water. This process is called Photosynthesis.
- It occurs in leaf, stem and green part of plants.

6. What is respiratory quotient?

$$R.Q = \frac{\text{Volume of CO2 liberated}}{Volume\ of\ O2\ consumed}$$

7. Why should the light dependent reaction occur before the light independent reaction?

- In the light-independent reaction or calvin cycle, the energized electrons from the light dependent reactions provide the energy to from carbohydrates from carbon dioxide molecules.

8. Write the reaction for photosynthesis?

$$6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Light}} C_6H_{12}O_6 + 6H_2O + 6O_2\uparrow$$

Carbon dioxide + Water Glucose + Water + Oxygen

VII. Long answer questions

1. Differentiate the following

a) Monocot root and Dicot root

Tissue	Monocot root	Dicot root
Number of Xylem	Tetrach	Polyarch
Cambium	Present (during seconadry growth)	Absent
Secondary growth	Present	Absent
Pith	Absent	Present

b) Aerobic and Anaerobic respiration

Aerobic respiration	Anaerobic respiration
It takes place in higher plants and animals	It takes place in lower plants (yeast and bacteria)
Oxygen is utilized for respiration	Oxygen is not utilized for respiration
Glucose is completely oxidized	Incomplete oxidation of glucose is oxidized
More energy in produced	Less energy is produced
The end products are CO_2, H_2O and energy	The end products are ethanol or lactic acid, CO_2 and energy.

2. Describe and name three stages of cellular respiration that aerobic organisms use to obtain energy from glucose.

<u>Stages of Aerobic respiration</u>

a) Glycolysis (Glucose splitting):

- It is the breakdown of one molecule of glucose into two molecules of pyruvic acid.
- Glycolysis takes place in cytoplasm of the cell.
- It is the first step of both aerobic and anaerobic respiration.

b) Krebs Cycle:

- This cycle occurs in mitochondria matrix.
- At the end of glycolysis, 2 molecules of pyruvic acid enter into mitochondria.
- The oxidation of pyruvic acid into CO_2 and water takes place through this cycle.

c) Electron Transport Chain

- ETC located on the inner membrane of the mitochondria.
- $NADH_2$ and $FADH_2$ molecules formed during glycolysis and Krebs cycle are oxidised to NAD+ and FAD+ to release the energy via electrons.

3. How does the light dependent reaction differ from the light independent reaction? What are the end product and reactants in each? Where does each reaction occur within the chloroplast?

Light dependent reaction	Light independent reaction
It takes place in the presence of light	It takes place in the absence of light
It is also known as Hill reaction or Light reaction	It is also known as Calvin Cycle or Dark reaction
It is named as Hill reaction after its discoverer Hill	It is named Calvin Cycle after its discoverer Melvin Calvin.
Reactants - Light, Water, ADP and NADPH	Reactants - CO_2 , ATP and $NADPH_2$
End Product - O_2, ATP and $NADPH_2$	End Product - Carbohydrate.
It takes place in the thylakoid membranes (Grana) of the chloroplast.	It takes place in the stroma of the chloroplast

LESSON 13 STRUCTURAL ORGANISATION IN ANIMALS

V. Answer in a sentence

1. Give the common name of the Hirudinaria granulosa.

- The common name of the ***Hirudinaria granulosa*** is Indian Cattle Leech.

2. How does leech respire?

- Leech respires through the skin.

3. Write the dental formula of rabbit.

(Canines- 2/0, Incisors – 0/0, Pre Molar – 3/2, Molar – 3/3).

4. How many pairs of testes are present in leech?

- Eleven (11) pairs of testes are present in leech.

5. How is diastema formed in rabbit?

- The gap between incisors and premolar forms the diastema. Diastema helps in mastication and chewing of food in rabbit.

6. What organs are attached to the two bronchi?

- Lungs are attached to the two bronchi

7. Which organ acts as suction pump in leech?

- Pharynx acts as suction pump in leech.

8. What does CNS stand for?

- CNS stands for Central Nervous System.

9. Why is the teeth of rabbit called heterodont?

- As there are three different kinds of teeth (Incisors, Premolars and Molars)` in rabbit, the dentition is called heterodont.

10. How does leech suck blood from the host?

- Leech attaches itself to the body of the host by suckers. Jaws of mouth causes wound. Then the blood is sucked by pharynx.

VI. Short answer questions

1. Why are the rings of cartilages found in trachea of rabbit?

- Tracheal walls are supported by rings of cartilage. Cartilage is flexible tissue. They help in the free passage of air.

2. List out the parasitic adaptations in leech.

- Blood is sucked by pharynx.
- Anterior and posterior suckers help the leech attacks itself to the body of the host.

- The three jaws inside the mouth, causes a painless Y–shaped wound in the skin of the host.
- Blood is stored in the crop.

VII. Long answer questions

1. How is the circulatory system designed in leech to compensate the heart structure?

- haemocoelic system - No true blood vessels.
- Haemocoelic channels – contains blood like fluid.
- There are four longitudinal channels are there:
- Dorsal channel - lies above alimentary canal
- Ventral channel - lies below alimentary canal
- Lateral channel - lies either sides of the canals.
- All the four channels connected together at 26^{th} segment.

2. How does locomotion take place in leech?

- Locomotion in leech takes place by (i) Looping or crawling movement and (ii) Swimming movement.

i) Looping or crawling movement :

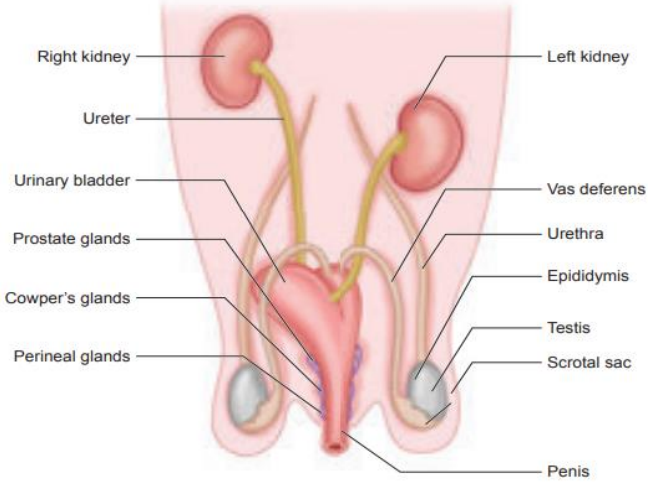
- This type of movement is brought about by the contraction and relaxation of muscles. The two suckers serve for attachment during movement on a substratum.

ii) Swimming movement :

- Leeches swim very actively and perform undulating movements in water.

3. Explain the male reproductive system of rabbit with a labelled diagram.

- Male reproductive system of rabbit consist of a pair of testes.
- Testes are enclosed by scrotal sacs.
- Each testis consists of numerous fine tubules called seminiferous tubule.
- Epididymis leads to vas deferens.
- The vas deferens join in the urethra just below the urinary bladder. The urethra runs backward and passes into the penis.
- There are three accessory glands namely prostate gland, cowper's gland and perineal gland. Their secretions are involved in reproduction.



LESSON 14 TRANSPIRATION IN PLANTS AND CIRCULATION IN HUMANS

V. Answer in a word or sentence

1. Name two layered protective covering of human heart.

- Two layered protective covering of human heart is Pericardium.

2. What is the shape of RBC in human blood?

- RBCs of human blood are biconcave or disc-shaped.

3. Why is the colour of the blood red?

- Blood is colour red due to the pigment hemoglobin.

4. Which kind of cells are found in the lymph?

- White Blood cells (WBC) are found in the lymph.

5. Name the heart valve associated with the major arteries leaving the ventricles.

- Semilunar valves are associated with the major arteries (Pulmonary artery and aorta) leaving the ventricles.

6. Mention the artery which supplies blood to the heart muscle.

- Coronary artery supplies blood to the heart muscles.

VI. Short answer questions

1. What causes the opening and closing of guard cells of stomata during transpiration?

- The opening and closing of the stomata is due to the change in turgidity of the guard cells.
- When turgidity increases within the two guard cells stoma opens.
- When the guard cells lose water, it becomes flaccid and the stoma closes

2. What is cohesion?

- The force of attraction between molecules of water is called cohesion

3. Trace the pathway followed by water molecules from the time it enters a plant root to the time it escapes into the atmosphere from a leaf.

ROOT HAIR ⟶ CORTICAL CELLS ⟶ XYLEM ⟶ STEM ⟶ LEAVES ⟶ ATMOSPHERE

4. What would happen to the leaves of a plant that transpires more water than its absorption in the roots?

- When transpiration exceeds water absorption by the roots, the plant dehydrates.
- Dehydration affects growth, photosynthesis etc. which can result in wilting and dying of the plant.

5. Describe the structure and working of the human heart.

- Heart is a pumping organ.
- Human heart is four chambered.
- Two upper thin walled artium.
- Two lower thick walled ventricles.
- Right atrium receives deoxygenated blood from varies parts of the body.
- Right and left auricles blood into the right and left ventricles.
- Aorta supplies oxygenated blood to varies parts of the body.
- The coronary arteries supply blood to the heart.

6. Why is the circulation in man referred to as double circulation?

- When the blood circulates twice through the heart in one complete cycle, it is called double circulation.

7. What are heart sounds? How are they produced?

- Lubb during the closure of tricuspid and bicuspid valve.
- Dubb during the closure of semilunar valve.

8. What is the importance of valves in the heart?

- Valves regulate the blood into a single direction and prevent back flow of blood.

9. Who discovered Rh factor? Why was it named so?

- Landsteiner and weiner discovered Rh factor in 1940.
- It was found in rhesus monkey so it is called as.

10. How are arteries and veins structurally different from one another?

S.no	Arteries	Veins
1	Wall of artery is strong, thick and elastic.	Wall of veins is weak, thin and non elastic.
2	Internal valves are absent.	Internal valves are present

11. Why is the Sinoatrial node called the pacemaker of heart?

- It is capable of initiating impulse which can stimulate the heart muscles to contract.

12. Differentiate between systemic circulation and pulmonary circulation.

S.no	Systemic circulation	Pulmonary circulation
1	It occurs between the heart and the entire body.	It occurs between heart and the lungs.
2	It carries oxygenated from the heart to around the body.	It carries deoxygenated blood from heart to lungs.
3	It carries deoxygenated blood to the heart.	It carries oxygenated blood to heart from lungs.

13. The complete events of cardiac cycle last for 0.8 sec. What is the timing for each event?

- Arterial systole - 0.1 sec.
- Ventricle systole - 0.3 sec.
- Ventricle diastole - 0.4 sec.

VIII. Long answer questions

1. How do plants absorb water? Explain.

- Water is absorbed along with minerals, by the root hairs, purely by diffusion.
- Root hairs are thin walled, slender extension of epidermal cell that increase the surface area of absorption.
- Once the water enters the root hairs, the concentration of water molecules in the root hair cells become more than that of the cortex.
- Thus water from the root hair moves to the cortical cells by osmosis and then reaches the xylem. From there the water is transported to the stem and leaves.
- Once water is absorbed by the root hairs, it can move deeper into root layers by two distinct pathways:
- **Apoplast pathway** : Movement of water occurs exclusively through the intercellular spaces and the walls of the cells.
- **Symplast pathway** : Movement the water travels through the cells.

2. What is transpiration? Give the importance of transpiration.

- Transpiration is the evaporation of water in plants through stomata in the leaves.

Importance of Transpiration:

- Creates transpirational pull for transport of water.
- Supplies water for photosynthesis.
- Transports minerals from soil to all parts of the plant.
- Cools the surface of the leaves by evaporation.
- Keeps the cells turgid; hence, maintains their shape.

3. Why are leucocytes classified as granulocytes and agranulocytes? Name each cell and mention its functions.

- Granulocytes : They contain granules in their cytoplasm.
- Agranulocytes : Granules are not found in the cytoplasm of these cells.

S.no	Name of granulocytes / agranulocytes	Functions
1	Neutrophils	Increase their number during infection and inflammation.
2	Eosinophils	Increase their number during allergy and parasitic infections.
3	Basophils	It releases chemicals during inflammation
4	Lymphocytes	They produce antibodies during viral and bacterial infection.
5	Monocytes	They are phagocytic and can engulf bacteria

4. Differentiate between systole and diastole. Explain the conduction of heart beat.

S.no	Systole	Diastole
1	It is the contraction of atrium and ventricles.	It is the relaxation of atrium and ventricles.
2	Due to systole, the auricles and ventricles push the blood out of heart.	Due to diastole, the auricles are filled with blood.
3	Atrial systole lasts about 0.1 seconds. Ventricular systole lasts about 0.3 seconds.	Ventricular diastole lasts about 0.4 seconds

The conduction of heart beat

- Sino-atrial node acts as the 'pacemaker' of the heart because it is capable of initiating impulse which can stimulate the heart muscles to contract.
- The impulse from the sinoatrial node spreads as a wave of contraction over the right and left atrial wall pushing the blood through the atrioventricular valves into the ventricles.
- The wave of contraction from SA node reaches the atrioventricular (AV) node which is stimulated to emit an impulse of contraction spreading to the ventricular muscle via the atrioventricular bundle and the Purkinje fibres.

5. Enumerate the functions of blood.

Functions of blood:

- Transport of respiratory gases (Oxygen and CO_2).
- Transport of digested food materials to the different body cells.
- Transport of hormones.
- Transport of nitrogenous excretory products like ammonia, urea and uric acid.
- It is involved in protection of the body and defense against diseases.
- It acts as buffer and also helps in regulation of pH and body temperature.
- It maintains proper water balance in the body.

LESSON 15 NERVOUS SYSTEM

VI. Short answer questions

1. Define stimulus.

- 'Stimulus' refers to the changes in the environmental condition, that are detected by receptors present in the body.

2. Name the parts of the hind brain.

- Hindbrain is formed of three parts

a) Cerebellum,

b) Pons and

c) Medulla oblongata

3. What are the structures involved in the protection of brain?

- The structures involved in the protection of brain are

a) Skull

b) Three membranes of meninges

i) Duramater ii) Arachnoid membrane and iii) Piamater

c) Cerebrospinal fluid.

4. Give an example for conditioned reflexes.

- Playing harmonium by striking a particular key on seeing a music note is an example of conditioned reflexes which required conscious training effort.

5. Which acts as a link between the nervous system and endocrine system?

- Hypothalamus acts as a link between the nervous system and endocrine system.

6. Define reflex arc.

- A reflex action is any response that occurs automatically without consciouness. The pathway taken by nerve impulse to accomplish reflex action is called reflex arc.

VII. Differentiate between

1. Voluntary and involuntary actions.

S.no.	Voluntary actions	Involuntary actions
1	The Voluntary actions are under the control of our will. E.g: Eating, Locomotion etc.	Involuntary action are not under our control. E.g: Breathing,Heart beat etc.
2	Involuntary action are not under our control. e.g Breathing,Heart beat etc.	It is controlled by the spinal cord.

2. Medullated and non-medullated nerve fibre.

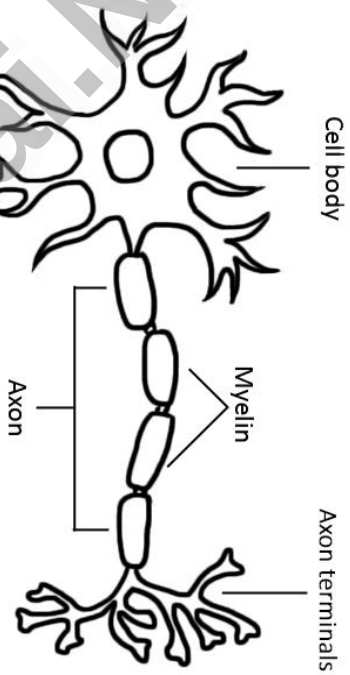
S.no.	Non-medullated nerve fibre	Medullated nerve fibre
1	The axon is **covered** with myelin sheath.	The axon is **not covered** by myelin sheath.
2	They form the **white** matter.	They form the **grey** matter.
3	Also known as Myelinated nerve fibre	Also known as Non-myelinated nerve fibre.

VIII. Long answer questions

1. With a neat labelled diagram explain the structure of a neuron.

Cyton :

- Cyton is also called cell body.
- It has a central nucleus with abundant cytoplasm called neuroplasm.
- Neurons do not have the ability to divide.



Dendrites:

- These are the numerous branched cytoplasmic processes that project from the surface of the cell body. They conduct nerve impulses towards the cyton.
- The branched projections increase the surface area for receiving the signals from other nerve cells.

Axon:

- The axon is a single, elongated, slender projection.
- The plasma membrane of axon is called axolemma, while the cytoplasm is called axoplasm. It carries impulses away from the cyton.
- Myelin sheath breaks at intervals by depressions called Nodes of Ranvier.
- Myelin sheath acts as insulator and ensures rapid transmission of nerve impulses.

2. Illustrate the structure and functions of brain.

- A human brain is formed of three main parts: (a) forebrain (b) midbrain and (c) hindbrain.
- Forebrain: The forebrain is formed of cerebrum and diencephalon. The latter consists of dorsal thalamus and ventral hypothalamus.

Cerebrum

- It is the largest part portion.
- It is divided into two halves of cerebral hemisphere.
- The **outer part** is formed of **white** matter called cerebral cortex.
- The **inner part** is formed of **grey** matter called cerebral medulla.
- It is responsible for thinking, intelligence, memory, imagination and reasoning.

Thalamus:

- It is present in cerebral medulla.
- It is a centre of sensory and motor signaling.
- It acts as relay centre.

Hypothalamus:

- It lies at the base of thalamus.
- It controls hunger, thirst, sleep, sweating, sexual desire, anger, fear, etc.

Mid brain:

- It is located between fore brain and hind brain
- It controls visual and hearing reflexes.

Hind brain:

- It is formed of 3 parts cerebellum, pons and medulla oblongata.

Cerebellum:

- It is second largest part of brain.
- It coordinates voluntary movements and maintance body balance.

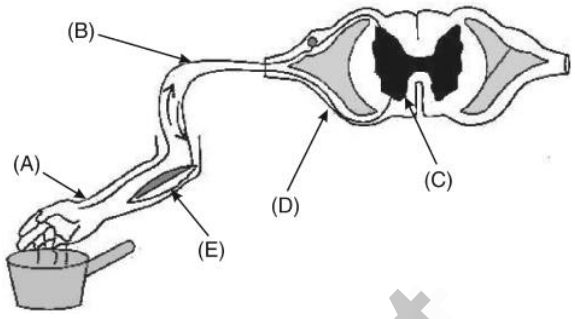
Pons:

- It connects the lobes of cerebellum.
- It controls respiration and sleep cycle.

Medulla oblongata:

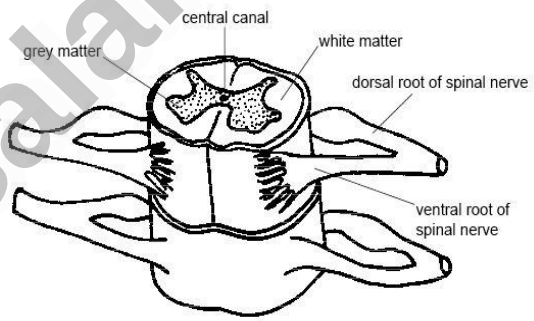
- It connects spinal cord and various parts of brain.
- It controls vomiting and salivation.

3. What will you do if someone pricks your hand with a needle? Elucidate the pathway of response with a neat labelled diagram.



- When a needle pricks our hand, we withdraw our hand away from the source of pain, the needle. This stimulus (pain) in turn triggers an impulse in sensory neuron.
- The sensory neuron transmits or conveys the message to the spinal cord.
- Spinal cord interprets the stimulus and the impulse is passed on to the relay neuron which in turn transmits it to a motor neuron.
- Motor neurons carry command from spinal cord to our arm.
- Muscle in our arm contracts and we withdraw our hand immediately from the source of pain, the needle.

4. Describe the structure of spinal cord.

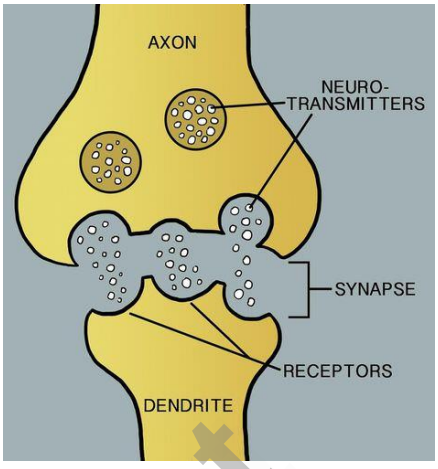


- Cylindrical structure.
- Protected by vertebral coloumn.
- Covered by meninges.
- Spinal cord contains cerebrospinal fluid (CSF).
- It contains white matter and grey matter (H shaped).
- Afferent root – fiber pass into the posterior horn.
- Efferent root – Fiber pass into the anterior horn.Spinal cord conducts sensory and motor impulses to and from the brain.

5. How nerve impulses are transferred from one neuron to next neuron?

- All the information from the environment are detected by the receptors located in our sense organs such as the eyes, the nose, the skin etc.
- Information from the receptors is transmitted as electrical impulse and is received by the dendritic tips of the neuron.
- This impulse travels from the dendrite to the cell body and then along the axon to its terminal end.
- On reaching the axonal end, it causes the nerve endings to release a chemical called neurotransmitter which diffuses across a synapse and starts a similar electrical impulse in the dendrites of the next neuron, then to their cell body to be carried along the axon.
- In this way, the electrical signal reaches the brain or spinal cord.

- The response from brain (or spinal cord) is similarly passed on to the effector organs such as the muscle or gland cell, that undergoes the desired response.
- The flow of nerve impulses from axonal end of one neuron to dendrite of another neuron through a synapse is called synaptic transmission.



6. Classify neurons based on its structure.

- Based on structure the neurons classified as follows:

i) Unipolar neurons:

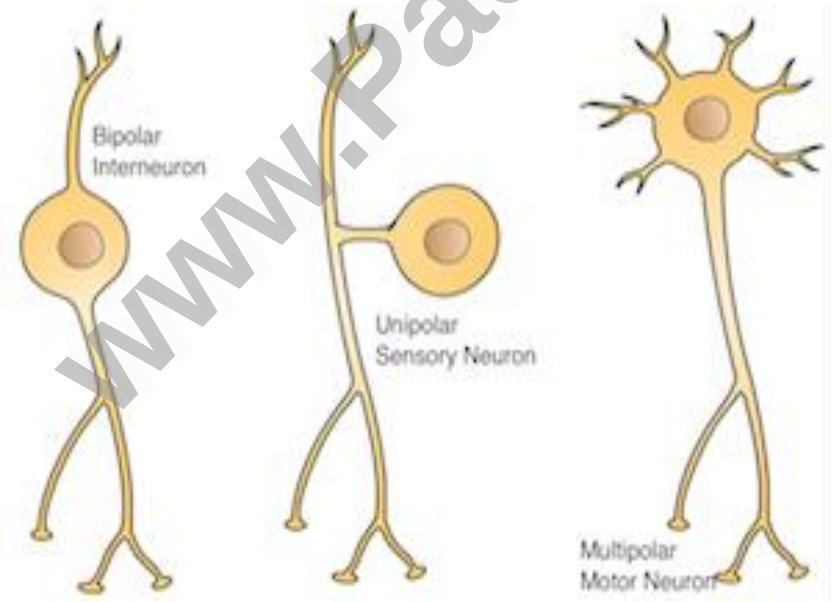
- Only one nerve process arises from the cyton which acts as both axon and dendron.
- They found in early embryos but not in adult.

ii) Bipolar neurons:

- The cyton gives rise to two nerve processes of which one acts as an axon while another as a dendron.
- They found in retina of eye and olfactory epithelium of nasal chambers.

iii) Multipolar neurons:

- The cyton gives rise to many dendrons and an axon.
- They found in cerebral cortex of brain.



LESSON 16 PLANT AND ANIMAL HORMONES

VI Answer in a word or sentence

1. Which hormone promotes the production of male flowers in Cucurbits?

- Gibberellins

2. Write the name of a synthetic auxin.

- 2,4 Dichlorophenoxy Acetic Acid.

3. Which hormone induces parthenocarpy in tomatoes?

- Gibberellins.

4. What is the hormone responsible for the secretion of milk in female after child birth?

- Prolactin

5. Name the hormones which regulates water and mineral metabolism in man.

- Aldesterone.

6. Which hormone is secreted during emergency situation in man?

- Adrenalin and nor Adrenalin

7. Which gland secretes digestive enzymes and hormones?

- Pancreas.

8. Name the endocrine glands associated with kidneys.

- Adrenal gland.

VII Short answer questions

1. What are synthetic auxins? Give examples.

- Artificially synthesized auxins that have properties like auxins are called as synthetic auxins. Example: 2, 4 D (2,4 Dichlorophenoxy Acetic Acid).

2. What is bolting? How can it be induced artificially?

- Bolting : Treatment of rosette plants with gibberellin induces sudden shoot elongation followed by flowering. This is called bolting.
- It is induced by artificial treatment with plant hormone gibberellin.
- It causes stem elongation in plants under normal condition.

3. Bring out any two physiological activities of abscisic acid.

- ABA promotes the process of abscission (separation of leaves, flowers and fruits from the branch). ABA promotes senescence in leaves by causing loss of chlorophyll.

4. What will you do to prevent leaf fall and fruit drop in plants? Support your answer with reason.

- We can spray auxins to prevent leaf fall and fruit drop in plants. Auxins prevent the formation of abscission layer thus delay the abscission of leaves and fruits. So leaf and fruit can remain attached to the stem long time.

5. What are chemical messengers?

- Hormones are powerful messengers that control and coordinate essential processes such as growth, metabolism and fertility by carrying messges from endocrine glands to target cells and tissues.

6. Write the differences between endocrine and exocrine gland.

Endocrine gland	Exocrine gland
They secrete hormones	They secrete enzymes, saliva and milk
They are ductless gland	They may have or may not have ducts
They are transported through blood stream	They are transported through ducts or tubes

7. What is the role of parathormone?

- Role of parathormone
- The parathormone regulates calcium and phosphorus metabolism in the body.
- They act on bone, kidney and intestine to maintain blood calcium levels.

8. What are the hormones secreted by posterior lobe of the pituitary gland? Mention the tissues on which they exert their effect.

Hormoes	Effects
Vasopressin or Antidiuretic hormone	Tissues of kidney tubules
Oxytocin	Tissues of uterus and mammary gland

9. Why are thyroid hormones referred as personality hormone?

- As thyroid hormones (Triiodothyronine (T3) and Tetraiodothyronine (T4) or Thyroxine) are essential for normal physical, mental and personality development, they are also known as personality hormone.

10. Which hormone requires iodine for its formation? What will happen if intake of iodine in our diet is low?

- Triiodothyronine (T3) and Tetraiodothyronine.
- Less intake of Iodine leads to Goitre.

VIII. Long answer questions

1. (a) Name the gaseous plant hormone. Describe its three different actions in plants.

- **Ethylene** is the gaseous plant hormone.
- Ethylene promotes the ripening of fruits E.g: Tomato, Apple, Mango, Banana, etc.
- Ethylene inhibits the elongation of stem and root in dicots.
- Ethylene hastens the senescence of leaves and flowers.
- Ethylene breaks the dormancy of buds, seeds and storage organs.

(b) Which hormone is known as stress hormone in plants? Why?

- Abscisic acid (ABA) is the stress hormone. Because it increases tolerance of plants to various kinds of stress. So, it is called as stress hormone.

2. Describe an experiment which demonstrates that growth stimulating hormone is produced at the tip of coleoptile.

- Frits Warmolt Went demonstrate the effect of auxin in plants.
- He did experiments in Avena coleoptiles.
- In his experiment he removed the tip of Avena coleoptiles.
- The cut tip did not grow. Indicates something essential for growth.
- In second experiment he placed agar block on tip.
- It also did not shown any response.
- He discarded the agar block.
- It grew straight up.
- He conclude that it need some chemical on the top of coleoptiles responsible for growth.
- He named the chemical Auxin means to grow.

3. Write the physiological effects of gibberellins.

- Gibberellins break dormancy of potato tubers.
- Gibberellins inducing the formation of seedless fruits. (E.g: Tomato)
- Gibberellins promote the production of male flowers in monoecious plants (Cucurbits).
- Treatment of rosette plants with gibberellin induces sudden shoot elongation followed by flowering. This is called bolting.
- Application of gibberellins stimulates extraordinary elongation of internode. eg: Corn and Pea.

4. Where are estrogens produced? What is the role of estrogens in the human body?

- Estrogens are produced by the Graafian follicles of the ovary.
- It brings about the changes that occur during puberty.
- It initiates the process of Oogenesis.
- It stimulates the maturation of ovarian follicles in the ovary.
- It promotes the development of secondary sexual characters.

5. What are the conditions which occur due to lack of ADH and insulin? How are the conditions different from one another?

- Lack of ADH causes Diabets insipidus.
- Lack of Insulin causes Diabetes mellitus.

Diabetes insipidus	Diabetes mellitus
It reduces reabsorption water in kidney tubules	It increases blood sugar level
Symptoms: ➢ Polyuria ➢ Dehydration ➢ Polydipsia	**Symptoms:** ➢ Polyuria ➢ Polydipsia ➢ Polyphagia ➢ Glycosuria.

LESSON 17 REPRODUCTION IN PLANTS AND ANIMALS

V. Answer in a word or sentence

1. If one pollen grain produces two male gametes, how many pollen grains are needed to fertilize 10 ovules?

- Ten pollen grains are needed to fertilize 10 ovules.
- Because of double fertilization.

2. In which part of the flower germination of pollen grains takes place?

- Stigma surface of the flower.

3. Name two organisms which reproduces through budding.

- Yeast and Bryophyllum.

4. Mention the function of endosperm.

- Nutritive tissue.
- It provides food to the developing embryo.

5. Name the hormone responsible for the vigorous contractions of the uterine muscles.

- Oxytocin

6. What is the enzyme present in acrosome of sperm?

- Hyaluronidase – helps to enter sperm into developing embryo.

7. When is World Menstrual Hygiene Day observed?

- Every year May 28.

8. What is the need for contraception ?

- Contraception is one of the best birth control measures. Contraception is needed to follow the small family norms, which improve economic status, living status and the quality of life.

9. Name the part of the human female reproductive system where the following occurs.

a. Fertilization - Ampulla of fallopian tube

b. Implantation - in the uterus.

VI. Short answer question

1. What will happen if you cut planaria into small fragments?

- If we cut a Planaria into small fragments, over time each piece will regenerate into a complete worm by the process regeneration.

2. Why is vegetative propagation practiced for growing some type of plants?

- Some plants have reduced power of sexual reproduction.
- Seeds of some plants have long dormant period or poor viability.
- It is a rapid and easier method.
- Good characters can be preserved

3. How does binary fission differ from multiple fission?

Binary fission	Multiple fission
A single parent cell divides into two daughter cells	A single parent cell divides into many daughter cells
It occurs during favourable conditions eg: Amoeba	It occurs during unfavourable conditions eg: Plasmodium

4. Define triple fusion.

- The fusion of second sperm (n) with secondary nucleus (2n) is known as triple fusion. As the result of triple fusion endosperm nucleus is formed.
- Second sperm (n) + Secondary nucleus (2n) = Endosperm nucleus (3n).

5. Write the characteristics of insect pollinated flowers.

- To attract insects these flowers are brightly coloured, have smell and nectar.
- The pollen grains are larger in size, the exine is pitted, spiny etc., so they can be adhered firmly on the sticky stigma.

6. Name the secondary sex organs in male

- Penis.
- Prostate gland.
- Vas deferens, etc.

7. What is colostrum? How is milk production hormonally regulated?

- The first fluid which is released from the mammary gland after child birth is called as colostrum.
- Milk production is stimulated by prolactin secreted from the anterior pituitary.
- The ejection of milk is stimulated by posterior pituitary hormone oxytocin.

8. How can menstrual hygiene be maintained during menstrual days?

- Sanitary pads should be changed regularly.
- Use of warm water to clean genitals helps to get rid of menstrual cramps.
- Wearing of loose clothing.

9. How does developing embryo gets its nourishment inside the mother's body?

- The embryo gets nutrition from the mother's blood with the help of special tissue called placenta.
- Umbilical cord connects the placenta and foetus.

10. Identify the parts A, B, C and D A B C D

- A : Exine.
- B : Intine.
- C : Generative cell.
- D : Vegetative nucleus.

11. Write the events involved in the sexual reproduction of a flowering plant.

a. Discuss the first event and write the types.

- Pollination.
- Fertilization

b. Mention the advantages and the disadvantages of that event.

Advantages:

- Self-pollination is possible in certain bisexual flowers.
- Flowers do not depend on agents for pollination.
- More viable seeds are produced.

Disadvantages:

- More wastage of pollen grains.
- The seeds are less in numbers.
- It may introduce some unwanted characters.

12. Why are the human testes located outside the abdominal cavity? Name the pouch in which they are present.

- Because spermatogenesis need slightly lower than the normal temperature.
- Testes are present in the scrotum.

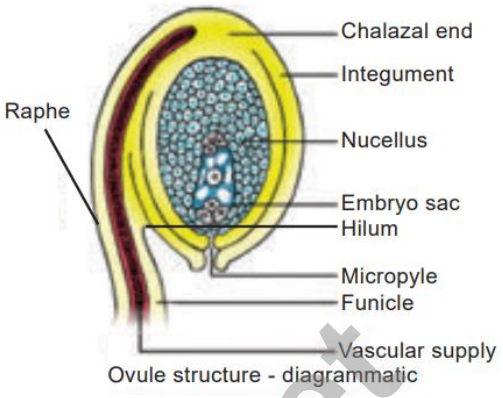
13. Luteal phase of the menstrual cycle is also called the secretory phase. Give reason.

- Female hormones like Estrogen and progesterone secrete in this phase. So it is called secretory phase.

VII. Long answer questions

1. With a neat labelled diagram describe the parts of a typical angiospermic ovule.

- The nucellus is enveloped by one or two protective coverings called integuments
- Hilum is represents the junction between ovule and funicle.
- In an inverted ovule, the funicle is adnate to the body of the ovule forming a ridge called raphe.
- Nucellus is a parenchymatous tissue reserve food.
- Inner layer perfrom nutritive function for the embryo sac and is called as endothelium or integumentary tapetum (Example : Asteraceae)



Ovule structure - diagrammatic

2. What are the phases of menstrual cycle? Indicate the changes in the ovary and uterus.

Phase	Days	Changes in Ovary	Changes in Uterus
Menstrual phase	4–5 days	Development of primary follicles	Breakdown of uterine endometrial lining leads to bleeding
Follicular phase	6^{th}–13^{th} day	Primary follicles grow into mature Graafian follicle	Endometrium regenerates through proliferation
Ovulatory phase	14^{th} day	The Graafian follicle ruptures, and releases the ovum(egg)	Increase in endometrial thickness
Luteal phase	15^{th}– 28^{th} day	Emptied Graafian follicle develops into corpus luteum	If fertilization take place – Endometrium prepared for implantation. If fertilization does not take place – corpus luteum regenerate.

LESSON 18 GENETICS

V. Answer in a sentence

1. What is a cross in which inheritance of two pairs of contrasting characters are studied?

- A cross in which inheritance of two pairs of contrasting characters are studied is called Dihybrid cross.

2. Name the conditions when both the alleles are identical?

- Homozygous - the conditions when both the alleles are identical (TT or tt)

3. A garden pea plant produces axial white flowers. Another of the same species produced terminal violet flowers. Identify the dominant trait?

- The dominant trait is axial white flower.

4. What is the name given to the segments of DNA, which are responsible for the inheritance of a particular character?

- Gene is the segments of DNA, which are responsible for the inheritance of a particular character

5. Name the bond which binds the nucleotides in a DNA.

- Hydrogen bond binds the nucleotides in a DNA.

VI. Short answers questions

1. Why did Mendel select pea plant for his experiments?

- The flowers are bisexual.
- It is easy to cross–pollinate.
- It has a short life span.
- It has deeply defined contrasting characters.

2. What do you understand by the term phenotype and genotype?

- Phenotype : External expression of a particular trait.
- Genotype : Genetic expression of an organism.

3. What are allosomes?

- Sex chromosomes.
- Responsible for sex determination.
- A male has XY chromosome.
- A female has XX chromosome.

4. What are Okazaki fragments?

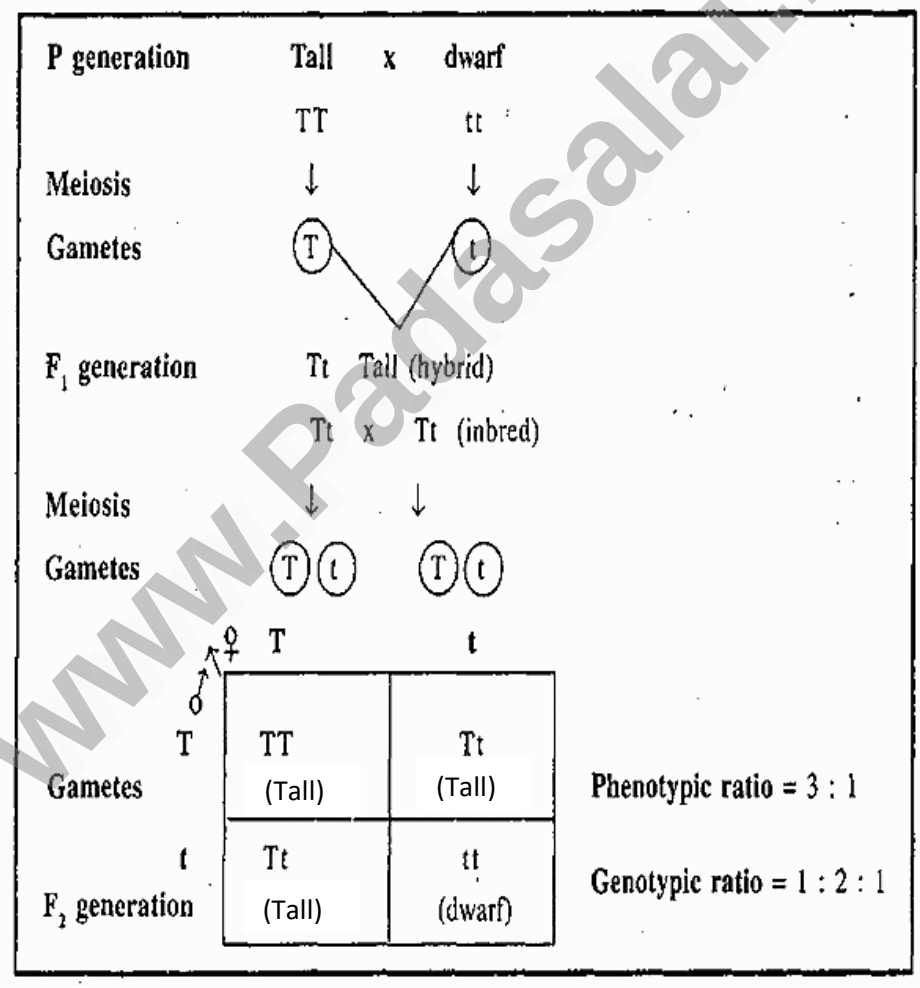
- Okazaki fragments are short sequences of DNA nucleotides which are synthesized discontinuously and later linked together by enzyme DNA ligase to create the lagging strand during DNA replication.

5. Why is euploidy considered to be advantageous to both plants and animals?

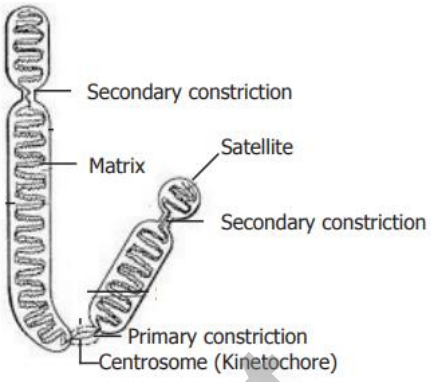
- Organisms with multiples of the basic chromosome set are called euploid.
- Plants with euploidy condition have increased fruit and flower size.
- Plants and animals with euploidy condition are typically sterile.

6. A pure tall plant (TT) is crossed with pure dwarf plant (tt), what would be the F1 and F2 generations? Explain.

- Mendel selected tall (TT) and dwarf (tt) garden pea plants, Pisum sativum, for the Monohybrid cross.

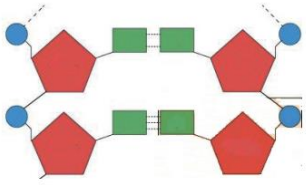


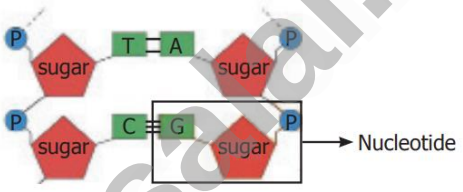
7. Explain the structure of a chromosome.



- Chromosome made up of two sister chromatids. Joined together by centromere.
- The chromosomes are made up of DNA, RNA, chromosomal proteins (Histones and non–histones) and certain metallic ions.
- These proteins provide structural support to the chromosome.
- Some chromosomes has a knob like structure called satellite.
- Chromosomes with satellite called SAT chromosome.

8. Label the parts of the DNA in the diagram given below. Explain the structure briefly.



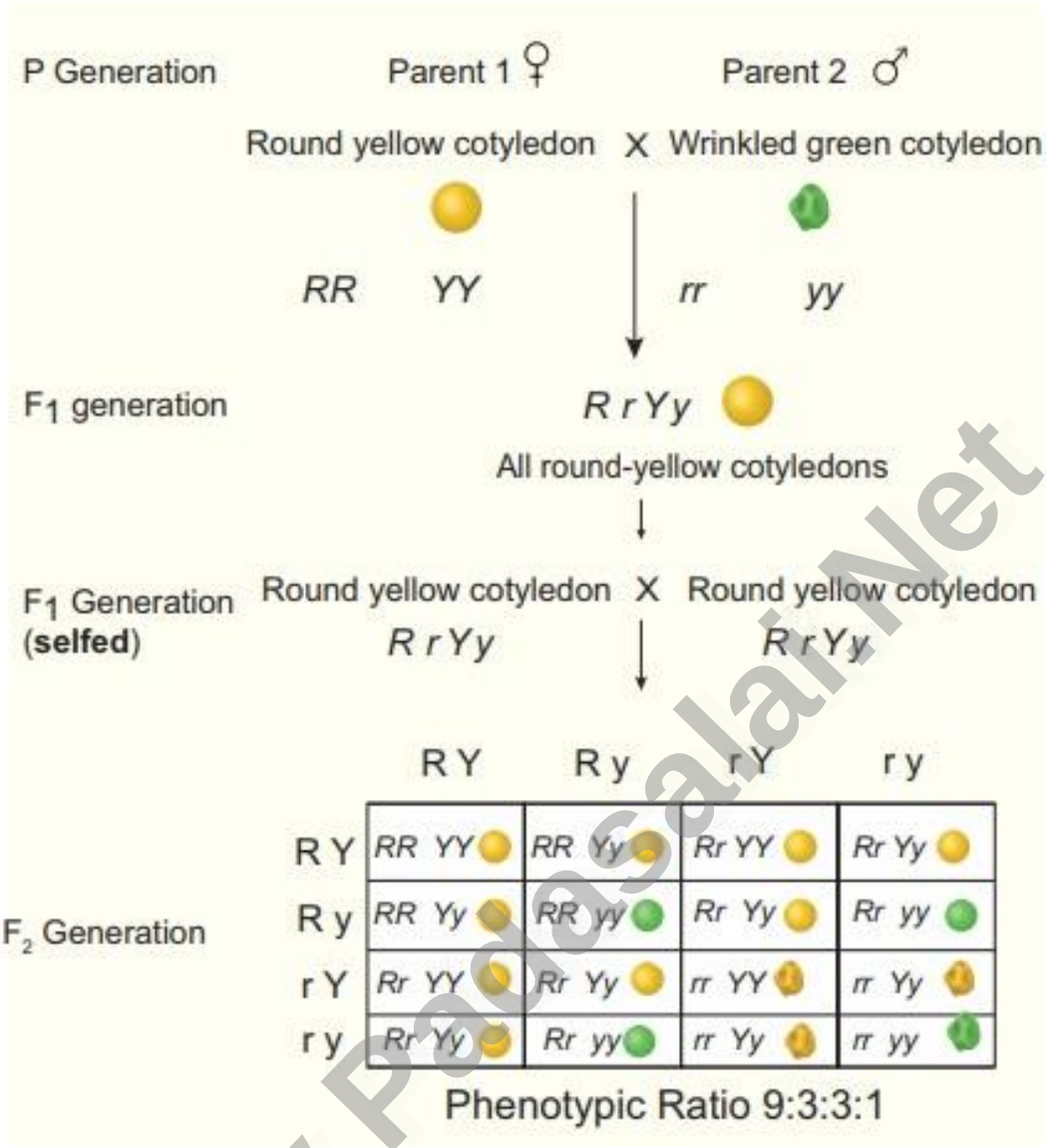


- A sugar molecules – Deoxyribose sugar.
- A nitrogenous base. There are two types of nitrogenous bases in DNA.
- They are; Purines (Adenine and Guanine).
- Pyrimidines (Cytosine and Thymine).
- A phosphate group.

VII. Long answer questions

1. Explain with an example the inheritance of dihybrid cross. How is it different from monohybrid cross?

Monohybrid cross	Dihybrid cross
The inheritance of one pair of contrasting characteristics	The inheritance of two pairs of contrasting characteristics
The phenotypic ratio is 3:1	The phenotypic ratio is 9:3:3:1



- Dihybrid cross involves the inheritance of two pairs of contrasting characteristics (or contrasting traits) at the same time.
- Characters (a) Yellow Round and (b) Green wrinkled.
- The parental gametes are RY and ry.
- The F1 generation were RrYy.
- The F1 hybrids are self fertilized for F2 generation.
- The ratio of each phenotype (or appearance) of seeds in the F2 generation is 9:3:3:1. This is known as the Dihybrid ratio.

2. How is the structure of DNA organised? What is the biological significance of DNA?

Structure of DNA:

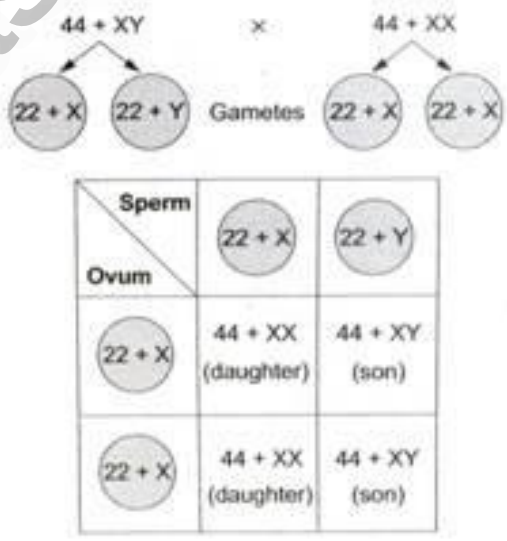
- DNA – Deoxy Ribose Nucleic Acid.
- Proposed by Watson and Crick in 1959.
- DNA is made up of 4 Base pairs of Nucleotides.
- Adenine always pairs with Thymine with two hydrogen bond.
- Guanine always pairs with Cytosine with three hydrogen bond.
- Each turn of the double helix is 34 A°

Significance:

- It is responsible for the transmission of hereditary information from one generation to next generation.
- It contains information required for the formation of proteins.
- It controls the developmental process and life activities of an organism.

3. The sex of the new born child is a matter of chance and neither of the parents may be considered responsible for it. What would be the possible fusion of gametes to determine the sex of the child?

- Humans have 23 pairs of chromosomes.
- 22 pairs are called Autosomes.
- 23rd pair called Allosomes.
- Males are heterogametic (44 XX+ XY)
- Females are homogametic (44XX + XX)
- Father determines the sex of the child.



LESSON 19 ORIGIN AND EVOLUTION OF LIFE

V Answer in a word or sentence

1. A human hand, a front leg of a cat, a front flipper of a whale and a bat's wing look dissimilar and adapted for different functions. What is the name given to these organs?

- Homologous organs.

2. Which organism is considered to be the fossil bird?

- Archaeopteryx is considered to be the fossil bird.

3. What is the study of fossils called?

- The study of fossils is called Palaeontology.

VI Short answers questions

1. The degenerated wing of a kiwi is an acquired character. Why is it an acquired character?

- The kiwi was flying bird in New Zealand.
- They did not attempt to fly because of no enemies on the land.
- Generation after generation resulting degeneration of wings and loss flight.
- This character is acquired due to environmental changes.
- So the degenerated wing of a kiwi is an acquired character.

2. Why is Archaeopteryx considered to be a connecting link?

- Archaeopteryx is the oldest known fossil bird.
- It is considered as a connecting link between birds and reptiles.
- It had wings and feathers like birds.
- It had a long tail, clawed digits and conical teeth like a reptiles.

3. Define Ethnobotany and write its importance.

- Ethnobotany is the study of a region's plants and their practical uses through the traditional knowledge of the local culture of people.

Importance of Ethnobotany:

- It provides traditional uses of plant.
- It gives information about certain unknown and known useful plants.
- The ethnomedicinal data will serve as a useful source of information for the chemists, pharmacologists and practitioners of herbal medicine.
- Tribal communities utilize ethnomedicinal plant parts like bark, stem, roots, leaves, flower bud, flowers, fruits, seeds, oils, resins, dyes, gum for the treatment of diseases like diarrhoea, fever, headache, diabetes, jaundice, snakebites, leprosy, etc.

4. How can you determine the age of the fossils?

- The age of fossils is determined by radioactive elements present in it. They may be carbon, uranium, lead or potassium.

Radioactive carbon (C^{14}) dating method :

- This method was discovered by W.F. Libby (1956).
- Carbon consumption of animals and plants stops after death and since then, only the decaying process of C^{14} occurs continuously. The time passed since death of a plant or animal can be calculated by measuring the amount of C^{14} present in their body.

VII Long answer questions

1. Natural selection is a driving force for evolution-How?

- **Overproduction:** Living beings have the ability to reproduce more individuals and form their own progeny. This will increase reproductive potential leading to overproduction.
- **Struggle for existence:** Overproduction creates an intense competition among the organisms for foodϖ and space leading to struggle.
- **Variation:** Small variations are important for evolution. According to Darwin favourable variations are useful to the organism. These variations are inherited by offspring from their parents.
- **Survival of the fittest or Natural selection:** During the struggle for existence, the organisms which can overcome the challenging situation, survive and adapt to the surrounding environment.
- Organisms which are unable to face the challenges, are unfit to survive and disappear. The process of selection of organisms with favourable variation is called as natural selection.
- **Origin of species:** According to Darwin, new species originates by the gradual accumulation of favourableϖ variations for a number of generations.

2. How do you differentiate homologous organs from analogous organs?

Homologous organs	Analogous organs
They have inherited from common ancestors with similar developmental pattern in embryos	They have different origin with different development pattern
Homologous organs look dissimilar and adapted for different functions.	The analogous organs look similar and perform similar functions.

Example 1: Forelimb of a frog and man seem to be built from the same basic design of bones but they perform different functions	Example 1 : Wings of birds and bats look similar. But in birds wings are covered by feathers all along the arm but the wings of bats is skin folds stretched between elongated fingers
Example 2 : A human hand, a front leg of a cat, flipper of a whate and a bat's wing look dissimilar and adapted for different functions	Example 2 : Penguins and fish both have fin–like structures to swim aquatic environments. These locomotory organs have different origin but look similar and perform similar function

3. How does fossilization occur in plants?

- The process of formation of fossil in the rocks is called fossilization. Common methods of fossilization includes petrifaction, molds and cast, carbonization, preservation, compression and infiltration.
- **Petrifaction:** Minerals like silica slowly penetrate in and replace the original organic tissue and formsϖ a rock like fossil. This method of fossilization can preserve hard and soft parts. Most bones and wood fossils are petrified.
- **Mold and Cast:** A replica of a plant or animal is preserved in sedimentary rocks. When the organism gets buried in sediment it is dissolved by underground water leaving a hollow depression called a mold. It shows the original shape but does not reveal the internal structure. Minerals or sediment fill the hollow depression and forms a cast.
- **Preservation:** Original remains can be preserved in ice or amber (tree sap). They protect the organismsϖ from decay. The entire plant or animal is preserved.
- **Compression:** When an organism dies, the hard parts of their bodies settle at the bottom of the sea bedϖ and are covered by sediment. The process of sedimentation goes on continuously and fossils are formed.
- **Infiltration or Replacement:** The precipitation of minerals takes place which later on infiltrate the cell wall. The process is brought about by several mineral elements such as silica, calcium carbonate and magnesium carbonate. Hard parts are dissolved and replaced by these minerals.

LESSON 20 PLANT BREEDING AND BIOTECHNOLOGY

VI Answer in a sentence

1. Give the name of wheat variety having higher dietary fibre and protein.

- Atlas 66

2. Semi-dwarf varieties were introduced in rice. This was made possible by the presence of dwarfing gene in rice. Name this dwarfing gene.

- Name of the dwarfing gene is sd1.

3. Define genetic engineering.

- It is technique of transfer of genes from one organism to another organism to create a new DNA called r DNA.
- It is also called recombinant DNA technology.

4. Name the types of stem cells.

- Somatic stem cell.
- Embryonic stem cell.

5. What are transgenic organisms?

- Plants or animals expressing a modified endogenous gene or a foreign gene is known as transgenic organisms.

6. State the importance of biofertiliser.

- It is used to develop the crop plants enriched with high level of desirable nutrients like vitamins, proteins and minerals.

VII Short answers questions

1. Discuss the method of breeding for disease resistance.

- Plant diseases are caused by pathogens like viruses, bacteria and fungi.
- This affects crop yield. Hence, it is important to develop disease resistant varieties of crops, that would increase the yield and reduce the use of fungicides and bactericides.

2. Name three improved characteristics of wheat that helped India to achieve high productivity.

- Higher yield with better quality. eg: Protein Rich Atlas 66
- Resistance to diseases. eg: Himgiri
- Shorter duration / Semidwarf. eg: Sonalika and Kalyan Sona.

3. Name two maize hybrids rich in amino acid lysine.

- Lysine (Amino acid) rich maize hybrids are; Protina, Shakti and Rathna.

4. Distinguish between a. somatic gene therapy and germ line gene therapy

Somatic Gene Therapy	Germ line Gene Therapy
It is the replacement of defective gene in somatic cell.	It is the replacement of defective gene in germ cell (sperm and egg)
Correction of genetic defects is beneficial to patient. It may not be carried to next generation	It may not be carried to next generation and will be beneficial to next generation.

b. undifferentiated cells and differentiated cells

Undifferentiated cells	Differentiated cells
They are unspecialized mass of cells.	They become specialized cells for doing certain jobs
Example: Cells in early embryos are undifferentiated.	Example: These cells become a liver cell, a blood cell, or a neuron, muscle cells, skin cells, etc.

5. State the applications of DNA fingerprinting technique.

- It is used in forensic lab to identify the culprit.
- It is also used for paternity testing in case of disputes.
- It is also helps in the study of genetic diversity of population, evolution and speciation.

6. How are stem cells useful in regenerative process?

- In treating neurodegenerative disorders like Parkinson's disease and Alzheimer's disease neuronal stem cells can be used to replace the damaged or lost neurons.

7. Differentiate between out breeding and inbreeding.

Out breeding	In breeding
It is the breeding of unrelated animals.	It is the breeding of closely related animals.
Cross between two different species with desirable features of economic value are mated.	Superior males and superior females of the same breed and identified and mated in pairs.

VIII Long answers questions

1. What are the effects of hybrid vigour in animals.

- Increased production of milk by cattle.
- Increased production of egg by poultry.
- High quality of meat is produced.
- Increased growth rate in domesticated animals.

Example 1: Cross breed of fowls:

White Leghorn X Plymouth Rock = Hybrid fowl - yield more eggs

2. Describe mutation breeding with an example.

- Sudden heritable changes in the nucleotide sequence of DNA.
- Factors inducing mutation called mutagens.

Physical mutagens:

- Radiations like X-rays, α, β and γ-rays, UV rays, temperature etc. which induce mutations are called physical mutagens.

Chemical mutagens:

- Chemical substances that induce mutations are called chemical mutagens. e.g. Mustard gas and nitrous acid. The utilisation of induced mutation in crop improvement is called mutation breeding.

Achievement:

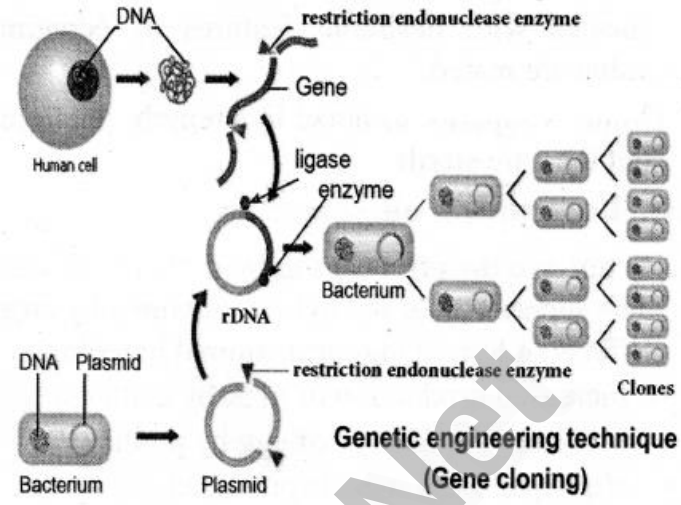
- Sharbati Sonora wheat produced from Sonora-64 by using gamma rays.
- Atomita 2 rice with saline tolerance and pest resistance.
- Groundnuts with thick shells.

3. Biofortification may help in removing hidden hunger. How?

- It is the scientific process of developing crop plants enriched with high levels of desirable nutrients like vitamins, proteins and minerals.
- Bio fortification is effective in removing hidden hunger and improving the nutritional value.
- Iron rich fortified rice variety.
- Atlas 66, a protein rich wheat variety.
- Vitamins enrich carrots, pumpkin and spinach.

4. With a neat labelled diagram explain the techniques involved in gene cloning.

- Cloning – making of an identical copies.
- Isolate the gene of interest.
- Cut by using restriction enzymes.
- Insert in bacteria with plasmid.
- Transfer r DNA into a bacterial cell.
- Selection and multiplication.



5. Discuss the importance of biotechnology in the field of medicine.

- Insulin used in the treatment of diabetes.
- HGH for growth deficiencies.
- Blood clotting factors for haemophilia.
- Tissue plasminogen activator to dissolve blood clot and to prevent heart attack.
- Vaccines for hepatitis B.
- Vaccines for rabies.

LESSON 21 - HEALTH AND DISEASE

VII. Answer in a sentence

1. What are psychotropic drugs?

- **psychotropic drugs** - which acts on the brain and alter the behavior, consciousness, power of thinking and perception.
- . They are referred as mood altering drugs.

2. Mention the diseases caused by tobacco smoke.

- Lung cancer
- Bronchitis
- Pulmonary tuberculosis
- Emphysema, etc.

3. What are the contributing factors for Obesity?

- Obesity is due to genetic factors, physical inactivity, eating habits (overeating) and endocrine factors.

4. What is adult onset diabetes?

- Non insulin dependent diabetes mellitus.

5. What is metastasis?

- The cancerous cells migrate to distant parts of the body and affect new tissues. This process is called metastasis.

6. How does insulin deficiency occur?

- Insulin deficiency occurs due destruction of β-cells of the pancreas.

VIII. Short answer questions

1. What are the various routes by which transmission of human immuno deficiency virus takes place?

- Sexual contact with infected person.
- Use of contaminated needles or syringe.
- Transfusion of affected blood and blood products.
- From infected mother to child through placenta.

2. How is a cancer cell different from a normal cell?

Normal cell	Cancer cell
Small in size	Large in size
Small number of dividing cells	Large number of dividing cells.
Organised cell arrangement	Disorganised cell arrangements.

3. Differentiate between Type-1 and Type-2 diabetes mellitus.

Factors	Type-1 Insulin dependent diabetes mellitus (IDDM)	Type-2 Non-insulin dependent diabetes mellitus (NIDDM)
Prevalence	10-20%	80-90%
Age of onset	Juvenile onset (< 20 years)	Maturity onset (>30 years)
Body weight	Normal or Underweight	Obese
Defect	Insulin deficiency due to destruction of β-cells	Target cells do respond to insulin
Treatment	Insulin administration is necessary	Can be controlled by diet, exercise and medicine

4. Why is a dietary restriction recommended for an obese individual?

- Low calorie, normal protein, vitamins and mineral, restricted carbohydrate and fat, high fiber diet can prevent overweight.

5. What precautions can be taken for preventing heart diseases?

- Intake of low carbohydrate, cholesterol food, etc.
- Diet rich in polyunsaturated fatty acid (PUFA).
- Regular exercise.
- Avoid alcohol consumption.
- Increase the intake of fruits and vegetables.

IX. Long answer questions

1. Suggest measures to overcome the problems of an alcoholic.

Education and counseling:

- Counseling the alcoholics to overcome their problems and stress, to accept failures in their life.

Physical activity:

- Activities like reading, music, sports, yoga and meditation.

Seeking help:

- The affected individuals should seek help and guidance from parents and peers.
- This will help them to share their wrong doing and get rid of the habit.

Medical assistance:

- Seek the help from psychologists and psychiatrists to lead a peaceful life.
- Alcohol de-addiction and rehabilitation programmes are helpful to the individual to live a normal and healthy life.

2. Changes in lifestyle is a risk factor for occurrence of cardiovascular diseases. Can it be modified? If yes, suggest measures for prevention.

- Yes, it can be modified.
- Intake of low carbohydrate, cholesterol food, etc.
- Diet rich in polyunsaturated fatty acid (PUFA).
- Regular exercises like walking, yoga, etc.
- Avoid alcohol consumption.
- Increase the intake of fruits and vegetables.
- Controlling calorie intake.
- Obesity places you at risk for high cholesterol.
- Reduce stress in a person's life.

LESSON 22 ENVIRONMENTAL MANAGEMENT

V. Answer in a sentence

1. What will happen if trees are cut down?

- Ecoogical problems like floods and drought
- Soil erosion
- Loss of wild life
- Extinction of species
- Imbalance of Biogeochemical cycles.
- Desertification.

2. What would happen if the habitat of wild animals is disturbed?

- The habitat provides food, shelter and protection to the animals. If the habitat is disturbed then the animals become unprotected and may decline in numbers and become endangered.

3. What are the agents of soil erosion?

- High velocity of wind
- Air currents
- Flowing water
- Landslide
- Human activities (deforestation, farming and mining) and
- Overgrazing by cattle.

4. Why fossil fuels are to be conserved?

- They are limited. Once they are exhausted there will be none.
- There are no ideal alternative for fossil fuels.
- We have to use in a control way to control global warming.

5. Solar energy is a renewable energy. How?

- Solar energy is the energy obtained from the sun.
- It is a renewable free source of energy that is sustainable and totally inexhaustible, unlike fossil fuels which are finite.

6. How are e-wastes generated?

- E-wastes are generally called as electronic wastes.
- They are generated from the spoiled, outdated, non repairable electrical and electronic devices

VI. Short answer questions

1. What is the importance of rainwater harvesting?

- Reduces flood and soil erosion.
- Overcome the rapid depletion of ground water levels.
- To meet the increase demand of water.
- Water stored in ground is not contaminated by human and animal wastes and hence can be used for drinking purpose.

2. What are the advantages of using biogas?

- It is safe and convenient to use.
- It burns without smoke and less pollution.
- It can reduce the amount of greenhouse gases emitted.

3. What are the environmental effect caused by sewage?

- Untreated sewage or wastewater generated from domestic and industrial process is the leading polluter of water sources in India.
- Sewage water results in agricultural contamination and environmental degradation.

4. What are the consequences of deforestation?

- Ecological problems like floods and drought
- Soil erosion
- Loss of wild life
- Extinction of species
- Imbalance of Biogeochemical cycles.
- Desertification.

VII. Long answer questions

1. How does rainwater harvesting structures recharge ground water?

- Rainwater harvesting is a technique of collecting and storing rainwater for future use.
- It is a traditional method of storing rain water.
- Purpose - to recharge 'groundwater level'.

Methods of rainwater harvesting :

- Roof top rainwater harvesting: Roof-tops are excellent rain catchers.
- The rain water that falls on the roof of the houses, apartments, commercial buildings etc. is collected and stored in the surface tank and can be used for domestic purpose.

Recharge pit:

- In this method, the rainwater is first collected from the roof tops or open spaces and is directed into the percolation pits through pipes for filtration.
- After filtration the rainwater enters the recharge pits or ground wells.

2. How will you prevent soil erosion?

- Retain vegetation cover, so that soil is not exposed.
- Cattle grazing should be controlled.
- Crop rotation and soil management improve soil organic matter.
- Runoff water should be stored in the catchment.
- Reforestation, terracing and contour ploughing.
- Wind speed can be controlled by planting trees in form of a shelter belt.

3. What are the sources of solid wastes? How are solid wastes managed?

- Sources of solid waste : i) Municipal wastes ii) Hospital wastes iii) Industrial wastes and iv) e-wastes
- Solid-waste management It involves the collection, treatment and proper disposing of solid material that is discarded from the household and industrial activities.

Segregation:

- It is the separation of different type of waste materials like biodegradable and non biodegradable wastes.

Sanitary landfill:

- Solid wastes are dumped into low lying areas. The layers are compacted by trucks to allow settlement. The waste materials get stabilised in about 2-12 months. The organic matter undergoes decomposition.

Incineration:

- It is the burning of non-biodegradable solid wastes (medical wastes) in properly constructed furnace at high temperature.

Composting:

- Biodegradable matter of solid wastes is digested by microbial action or earthworms and converted into humus.

Recycling of wastes:

- Papers from old books, magazines and newspapers are recycled to produce papers in paper mills.

- Agricultural wastes like coconut shells, jute cotton stalk, bagasse of sugarcane can be used to make paper and hard board. Paddy husk can be used as livestock fodder.Cow dung and other organic wastes can be used in gobar gas plant to provide biogas and manure for fields.

4. Enumerate the importance of forest.

- Forests are vital for human life
- it is a source for a wide range of renewable natural resource.
- They provide wood, food, fodder, fibre and medicine.
- They act as carbon sink, regulate climatic conditions, increase rainfall, reduce global warming, prevent natural hazards like flood and landslides, protect wildlife and also act as catchments for water conservation.
- They also play a vital role in maintaining the ecological balance

5. What are the consequences of soil erosion?

- Soil erosion causes a significant loss of humus, nutrients and decrease the fertility of soil.
- It affects the fertility of the soil.
- It affects the ground water level.
- Vegetation cover cannot be recovered.

6. Why is the management of forest and wildlife resource considered as a challenging task?

- People living in and around forests are dependent on forest ie plants and animals products for various aspects of their life such as livelihood.
- The forest department of the government who judicially allowed for owning the land and controlling the resources from forests.
- The industrialists who use forest products such as timber, leaves, latex and raw materials for their industries.
- Global warming and climate change results in water scarcity and changes in rainfall pattern in forest area.
- Lack of proper law enforcement and lack of sufficient number of guards lead to indiscriminate illegal poaching affects wildlife populations and the environment.

LESSON 23 VISUAL COMMUNICATION

III. Answer the following

1. What is Scratch?

- 'Scratch' is a software used to create animations, cartoons and games easily.
- It is a visual programming language.

2. Write a short note on editor and its types?

- Script editor / costume editor: Where you edit your programs or your sprite's pictures.
- The script editor has three main parts:
- Script area
- Block menu
- Block palette

3. What is Stage?

- Stage is the background appearing when we open the scratch window.
- The background will most often be white.
- We can change the background colour as you like.

4. What is Sprite?

- The characters on the background of a Scratch window are known as Sprite.
- Usually a Cat appears as a sprite

10th STD

Govt. Supplementary Examination
September - 2021

Part - III
SCIENCE
(with Answers)

Time : 3.00 hours. Marks: 75

Instructions: (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

Note: This question paper contains **four** parts.

PARt - I

Note: (i) Answer **all** the questions. **(12 × 1 = 12)**

(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. To project the rockets which of the following principle(s) is /(are) required?
   (a) Newton's third law of motion
   (b) Newton's law of gravitation
   (c) Law of conservation of linear momentum
   (d) Both (a) and (c)

2. SI unit of resistance is _____.
   (a) Mho (b) Joule
   (c) Ohm (d) Watt

3. Sound waves travel in air with a speed of about _____at NTP.
   (a) 340×10^8 m/s (b) 340 m/s
   (c) 3×10^8 m/s (d) 3×10^{-8} m/s

4. Unit of radioactivity is _____.
   (a) Roentgen (b) Curie
   (c) Becquerel (d) All the above

5. Alloy used in the manufacturing of pressure cooker is _____.
   (a) Brass (b) Bronze
   (c) Magnalium (d) Duralumin

6. The IUPAC name of an organic compound is 3-methyl butan-1-ol. What type compound it is?
   (a) Aldehyde (b) Carboxylic acid
   (c) Ketone (d) Alcohol

7. The concept of blood group is derived by _____.
   (a) Wiener (b) Karl Landsteiner
   (c) William Harvey (d) His

8. Syngamy results in the formation of _____.
   (a) Zoospores (b) Conidia
   (c) Zygote (d) Chlamydospores

9. The large elongated cells that provide nutrition to developing sperms are ____.
   (a) Primary germ cells (b) Sertoli cells
   (c) Leydig cells (d) Spermatogonia

10. Life originates from pre-existing life was showed by :
    (a) Louis Pasteur (b) Oparin
    (c) Haldane (d) Lamarck

11. Pusa Komal is a disease resistant variety of _____.
    (a) sugarcane (b) rice
    (c) cow pea (d) maize

12. ___is a rice variety produced by mutation breeding that grows well in saline soil.
    (a) Sharbati Sonora (b) Atomita 2
    (c) Pusa Gaurav (d) Himgiri

PARt - II

Note: **Answer any seven questions: Question No. 22 is compulsory** **(7 × 2 = 14)**

13. When a sound wave travels through air, the air particles :
    (a) vibrate along the direction of the wave motion.
    (b) vibrate but not in any fixed direction.
    (c) vibrate perpendicular to the direction of the wave motion.
    (d) do not vibrate.

14. (a) What is the audible range of frequency?
    (b) What is the minimum distance needed for an Echo?

15. Write any 2 uses of Ethanol.

16. What is respiratory quotient?

17. Draw and label the parts of a sperm.

18. What is called evolution?
19. Distinguish between somatic gene therapy and germ line gene therapy.
20. How is Cancer Cell different from Normal Cell?
21. How are e-wastes generated?
22. State Avogadro's Law.

PaRt - III

Note: answer any seven questions. Question No. 32 is compulsory. (7 × 4 = 28)

23. (a) Write the symbol for the following component.
    (i) Ground connection
    (ii) Resistor
    (iii) Light emitting diode
    (iv) A diode
    (b) A charge of 12 Coulomb flows through a bulb in 5 seconds. What is the current through the bulb?
24. (a) Define Atomicity.
    (b) Calculate the molecular mass of CO_2.
25. (a) How is rust formed? Give the equation for formation of rust.
    (b) State 2 methods of preventing corrosion.
26. (a) What is photosynthesis and where does it occur in a cell?
    (b) Differentiate Aerobic and Anaerobic respiration.
27. Name the gaseous plant hormone. Mention any three of its physiological effects in plants.
28. (a) What is pollination?
    (b) State the importance of pollination.
29. Explain the structure of chromosome.
30. Discuss the importance of biotechnology in the field of medicine.
31. How do rainwater harvesting structures recharge ground water?
32. $_{92}U^{238}$ experience α-decay. Find the number of neutrons in the daughter element.

PaRt - IV

Note : answer all the questions. Draw diagrams wherever necessary. (3 × 7 = 21)

33. (a) State Newton's Laws of motion.
    (OR)
    (b) (i) Differentiate the eye defects : Myopia and Hypermetropia.
    (ii) Write any 2 applications of concave lens.
34. (a) (i) What happens when $MgSO_4 . 7H_2O$ is heated? Write the appropriate equation.
    (ii) Explain hygroscopic substances and deliquescent substances with examples.
    (b) (i) What are called thermolysis reactions?
    (ii) Differentiate reversible and irreversible reactions.
35. (a) (i) Enumerate the functions of blood.
    (ii) Guard cells are responsible for opening and closing of stomata. Give reason for this statement.
    (OR)
    (b) (i) Suggest measures to overcome the problems of an alcoholic.
    (ii) What are the contributing factors for obesity?

□ □ □

Answers

PaRt - I

1. (d) Both (a) and (c)
2. (c) Ohm
3. (b) 340 m/s
4. (d) All the above
5. (d) Duralumin
6. (d) Alcohol
7. (b) Karl Landsteiner
8. (c) Zygote
9. (b) Sertoli cells
10. (a) Louis Pasteur
11. (c) cow pea
12. (b) Atomita 2

10th STD

INSTANT SUPPLEMENTARY EXAM AUGUST - 2022

Reg. No.

Part - III

Time Allowed : 3.00 Hours] **Science (With Answers)** **[Maximum Marks: 75**

Instructions : 1. Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.
2. Use **Blue** or **Black** ink to write and underline pencil to draw diagrams.

Note : This Question Paper contains **four** parts.

PART - I

Note: (i) Answer **all** the questions. **(12 × 1 = 12)**
(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. To project the rockets which of the following principle(s) is /(are) required?
   (a) Newton's Third Law of Motion
   (b) Newton's Universal Law of Gravitation
   (c) Law of Conservation of Linear Momentum
   (d) Both (a) and (c)

2. The gram molecular mass of oxygen is :
   (a) 16 g (b) 18 g
   (c) 32 g (d) 17 g

3. _____ is an important metal to form amalgam.
   (a) Ag (b) Hg (c) Mg (d) Al

4. Kilowatt hour is the unit of :
   (a) Resistivity
   (b) Conductivity
   (c) Electrical Energy
   (d) Electrical Power

5. The number of periods and groups in the periodic table are_____.
   (a) 6, 16 (b) 7, 17
   (c) 8, 18 (d) 7, 18

6. During transpiration, there is loss of :
   (a) Carbon dioxide (b) Oxygen
   (c) Water
   (d) Carbon monoxide

7. Which one of the following hormones is naturally not found in plants?
   (a) 2, 4-D (b) GA3
   (c) Gibberellin (d) IAA

8. World 'No Tobacco Day' is observed on :
   (a) May 31 (b) June 6
   (c) April 22 (d) October 2

9. Which of the following is / are a fossil fuel?
   (i) Tar (ii) Coal (iii) Petroleum
   (a) (i) only (b) (i) and (ii) only
   (c) (ii) and (iii) only (d) All of the above

10. Identify the exocrine gland.
    (a) Pituitary gland (b) Adrenal gland
    (c) Salivary gland (d) Thyroid gland

11. The endarch condition is the special characteristic feature of :
    (a) Root (b) Stem
    (c) Leaves (d) Flower

12. The heart of fishes possess_____chambers.
    (a) 3 (b) 4 (c) 2 (d) 5

PART - II

Note: Answer **any seven** questions. Question No. **22** is **compulsory.** **(7 × 2 = 14)**

13. Classify the types of force based on their application.

14. State Snell's Law.

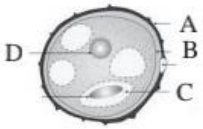
15. Define One Calorie.

16. Classify the following substances into deliquescent, hygroscopic.
    (a) Conc. Sulphuric acid
    (b) Copper Sulphate Penta hydrate

(c) Silica Gel
(d) Calcium Chloride
(e) Gypsum Salt

17. Why fossil fuels are to be conserved?

18. Identify the parts A, B, C, and D.



19. What do you understand by the term Phenotype and Genotype?

20. Why are thyroid hormones referred as 'personality hormone'?

21. Why is the colour of the blood red?

22. A person with myopia can see objects placed at a distance of 4m. If he wants to see objects at a distance of 20m, What should be the focal length and power of the concave lens he must wear?

PART - III

Note: Answer **any seven** questions. Question No. **32** is **compulsory.** **(7 × 4 = 28)**

23. Differentiate the eye defects : Myopia and Hypermetropia.

24. Describe Rocket Propulsion.

25. Write any four features of natural and artificial radiation.

26. Differentiate reversible and irreversible reactions.

27. What happens when the salt $MgSO_4.7H_2O$ is heated? Write the equation.

28. (i) What is respiratory quotient?
(ii) What are the factors affecting photosynthesis?

29. Differentiate Aerobic and Anaerobic respiration.

30. What are the contributing factors for obesity?

31. Define Ethnobotany and write its importance.

32. Calculate the resistance of a conductor through which a current of 2 A passes, when the potential difference between its ends is 30 V.

PART - IV

Note : Answer **all** the questions. Draw diagrams wherever **necessary.** **(3 × 7 = 21)**

33. (a) (i) Define inertia.
(ii) Explain the types of inertia with examples.

(OR)

(b) State Newton's Laws of Motion.

34. (a) (i) Define Relative Atomic Mass.
(ii) Define Atomicity.
(iii) Give any two examples for heterodiatomic molecules.

(OR)

(b) Give the salient features of "Modern atomic theory".

35. (a) (i) What is transpiration?
(ii) Give the importance of transpiration.

(OR)

(b) (i) List the functions of blood.
(ii) Draw the pictures of Granulocytes.

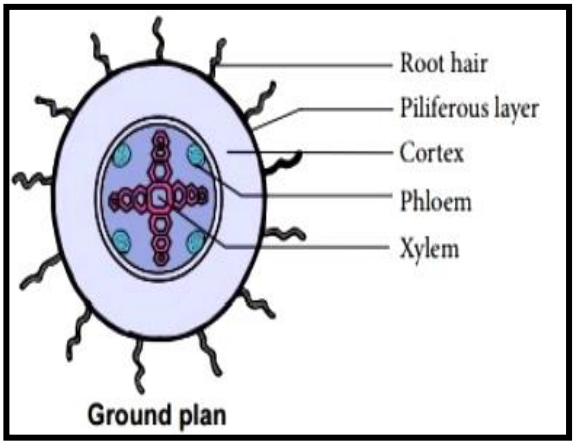
☆☆☆

Answers

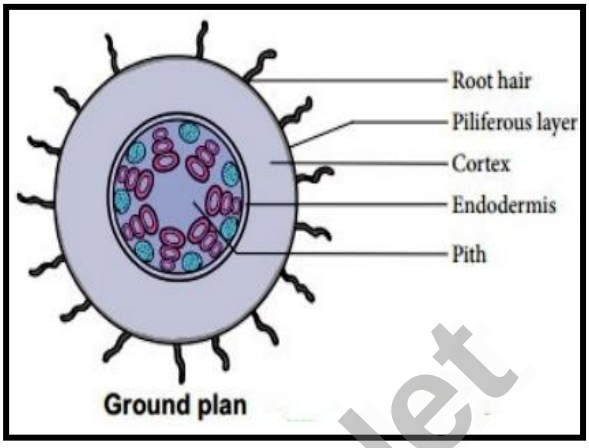
PART - I

1. (d) Both (a) and (c)
2. (c) 32 g
3. (b) Hg
4. (c) Electrical Energy
5. (d) 7, 18
6. (c) Water
7. (a) 2, 4-D
8. (a) May 31
9. (c) (ii) and (iii) only
10. (c) Salivary gland
11. (b) Stem
12. (c) 2

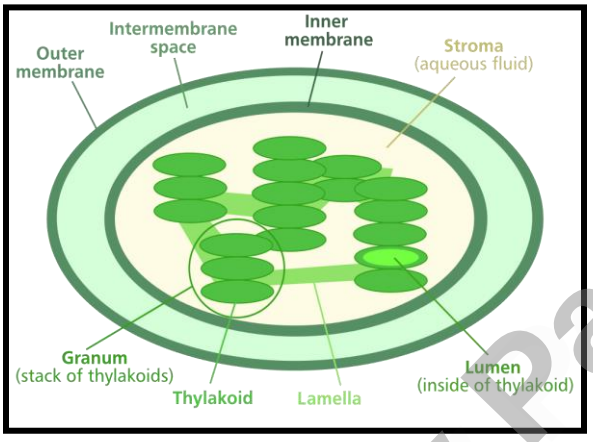
Ground plan of Dicot root



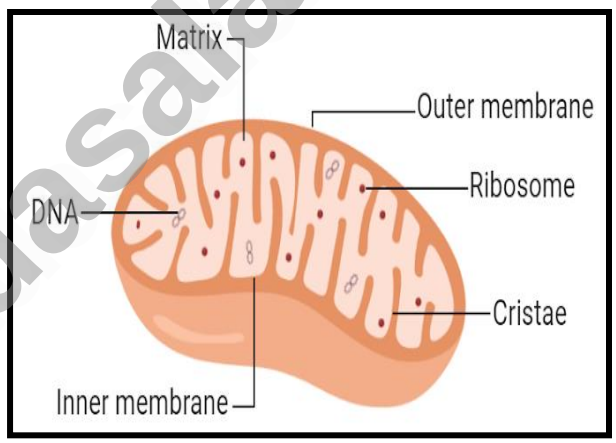
Ground plan of Monocot root



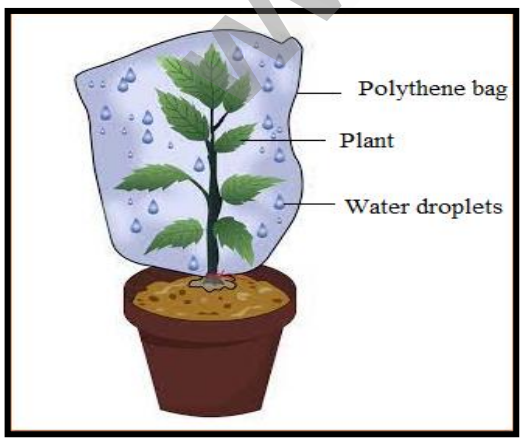
Chloroplast



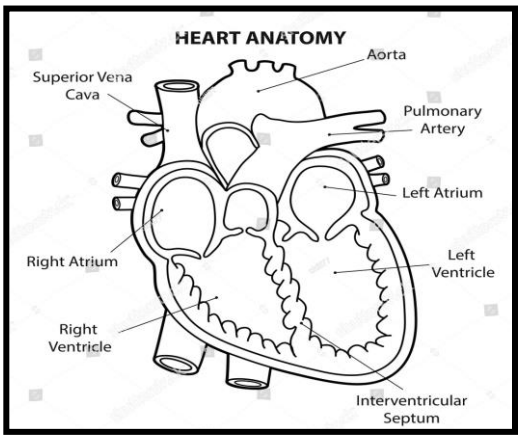
MItochondria



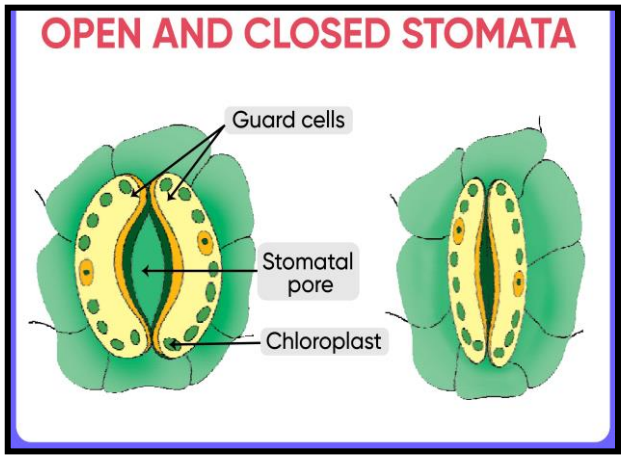
Transpiration



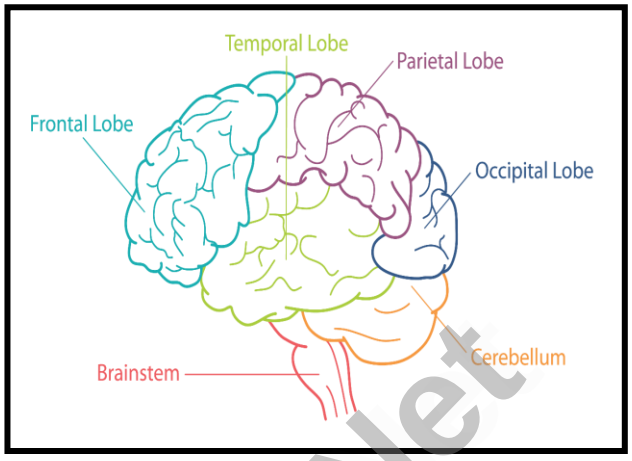
Human Heart



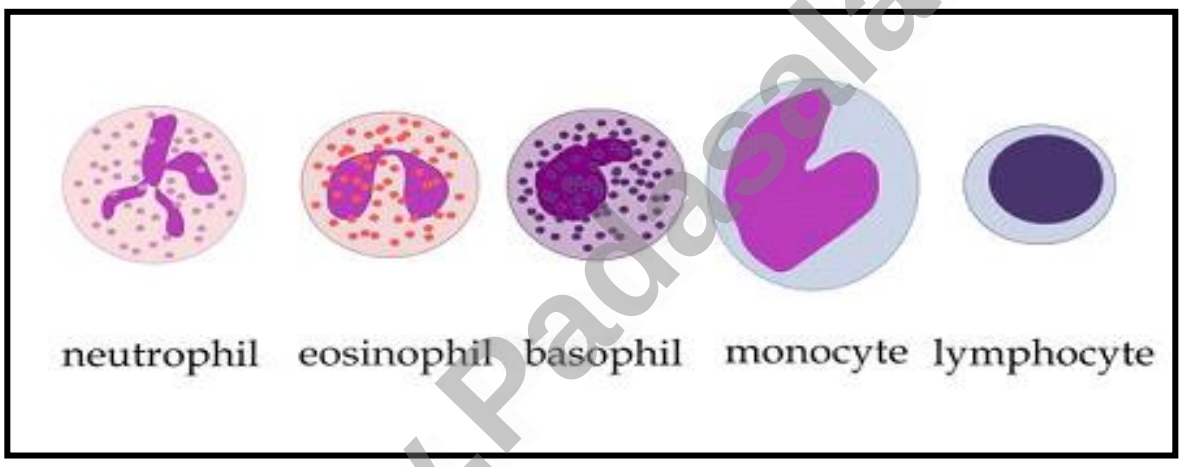
Stomata



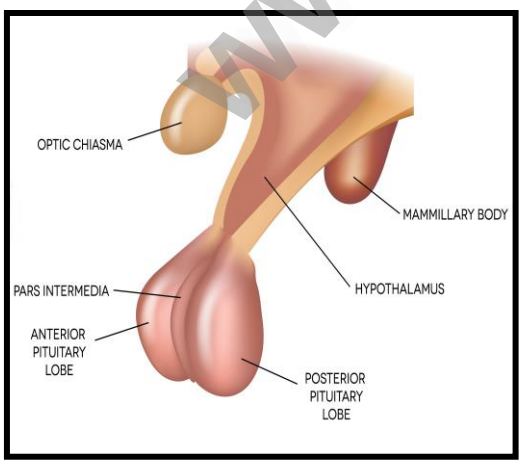
Human Brain



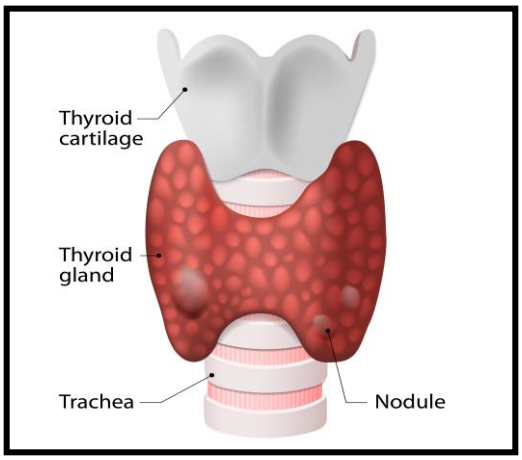
Leucocytes Granulocytes and Agranulocytes



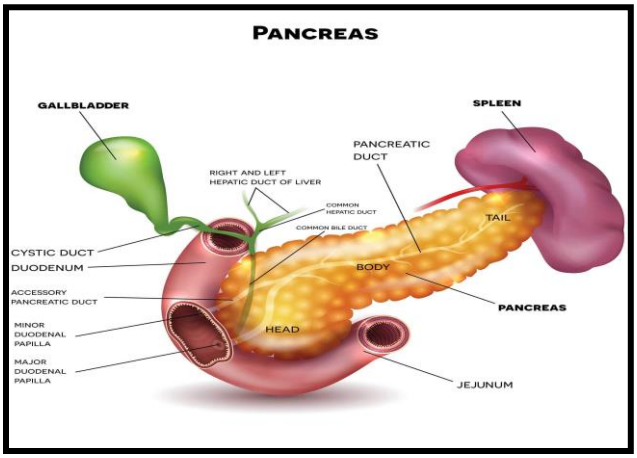
Pituitary Gland



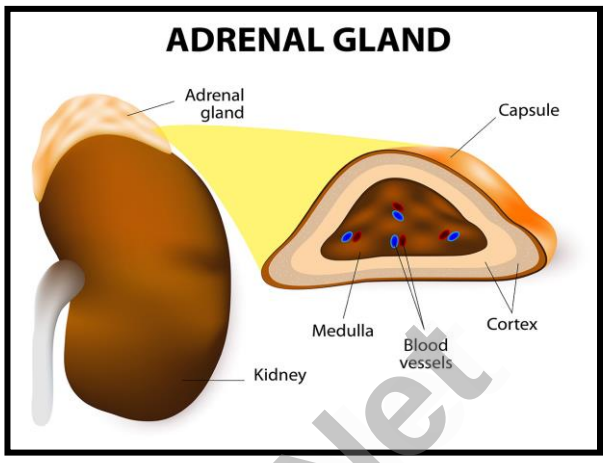
Thyroid Gland



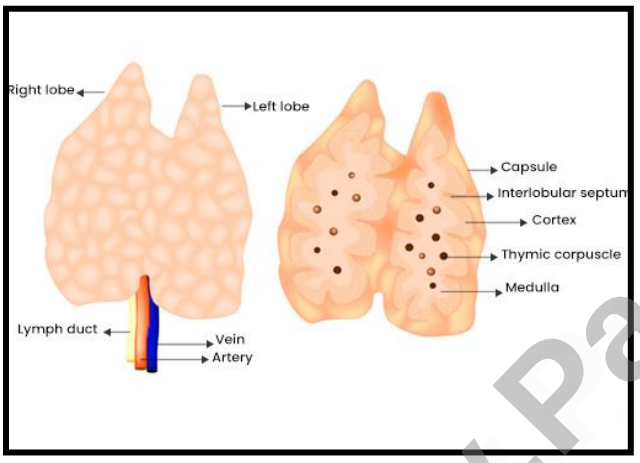
Pancreas



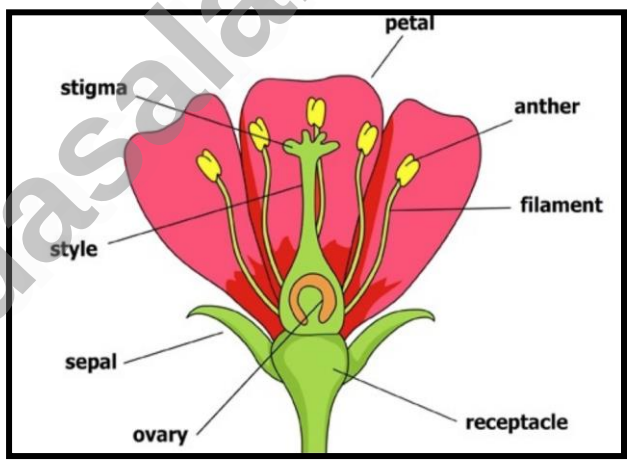
Adrenal gland



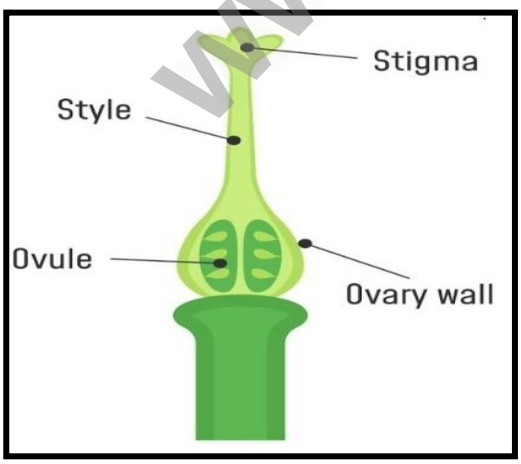
Thymus Gland



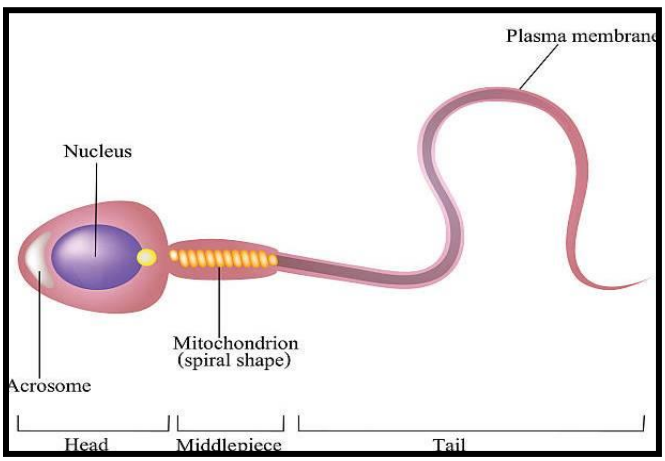
Parts of Flower



Structure of Gynoecium



Human Sperm



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Cell: **9629530212**